ROUTLEDGE

THE CYCLADIC AND AEGEAN ISLANDS IN PREHISTORY

INA BERG

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"Here at last is a handbook that covers all Aegean islands excepting Crete through their prehistory, from the Paleolithic era to the end of the Bronze Age. Sensibly organised in chronologically sequential chapters, each further broken down into a recurring topical format, Berg's representation of Aegean island archaeology is clear, full, and richly illustrated – a truly valuable teaching manual. Her synthesis of the rapidly accumulating evidence for the Paleolithic exploitation of Aegean islands is timely, while her assessment of where things stand in the ongoing controversy over the date and impact of the Theran volcano's catastrophic explosion early in the Late Bronze Age is both wide-ranging and fair."

– Jeremy Rutter, *Dartmouth College, USA*

This textbook offers an up-to-date academic synthesis of the Aegean islands from the earliest Palaeolithic period through to the demise of the Mycenaean civilization in the Late Bronze III period. The book integrates new findings and theoretical approaches whilst, at the same time, allowing readers to contextualize their understanding through engagement with bigger overarching issues and themes, often drawing explicitly on key theoretical concepts and debates. Structured according to chronological periods and with two dedicated chapters on Akrotiri and the debate around the volcanic eruption of Thera, this book is an essential companion for all those interested in the prehistory of the Cyclades and other Aegean islands.

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I cannot imagine a greater pleasure than being in Greece, in particular on the Greek islands, and I have had the privilege of researching aspects of island life throughout my academic career. It was the late Elizabeth Schofield who, when teaching a tutorial on the Minoanisation of the Cyclades during my exchange year in Cambridge, inspired me to make the Bronze Age Cyclades the focus of my research and I remain grateful to her for inspiring me. And it is thanks to Colin Renfrew, who granted permission for me to study the Middle and early Late Bronze Age pottery from Phylakopi for my PhD, that this dream became a reality.

Since those student days, I have spent much of my academic life exploring the islands, their archaeology and the surrounding sea by car, foot, and kayak. Many of my colleagues and friends share this love of islands and I am grateful to all of them for sharing their thoughts and ideas with me. They are too numerous to list here. Those to whom I owe the greatest debt and who have shaped my outlook on islands most profoundly are Cyprian Broodbank, Robin Barber, Colin Renfrew, Todd Whitelaw and Helen Dawson.

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Ina Berg

INTRODUCTION

Figure 0.1 Map of Greece and its island regions.

Greece is a country endowed with hundreds, if not thousands, of islands and islets of which around 200 are currently inhabited. Aside from the very large islands of Crete and Euboia and the Ionian Islands west of the Greek mainland in the Ionian Sea, there are five major island regions located in the Aegean Sea, the section of the Mediterranean Sea located between Greece and the Turkish coast (Figure 0.1). These are generally considered to be the ‘Aegean Islands’:

1 the *Cyclades*, wedged in a dense cluster between Crete and the Greek mainland,
2 the *Argo-Saronic Islands*, located in the Saronic Gulf between Attica and the Argolid,
3 the Dodecanese in the southeast Aegean,
4 the *Sporades*, a small cluster north of Euboia, and
5 the *North Aegean Islands*, a loose collection of islands stretching northwards off the Anatolian coast.

Of these island regions, it is the Cyclades in the middle of the Aegean Sea that have long captured scholars' imagination and have held a central place in prehistoric scholarship almost from the very beginnings of archaeological investigations. Not so the Dodecanese, the Sporades and the North Aegean Islands which, being located at the margins of modern Greece, have been considered peripheral areas by many scholars – their cultural affiliation sometimes more pronounced with Greece, sometimes with Anatolia.

The inspiration for writing this book was based on the realisation that there was a need for an academic synthesis that provides up-to-date knowledge of the archaeology of the Aegean Islands, integrates new findings and theoretical approaches while, at the same time, allowing students to contextualise their understanding through engagement with more theoretical debates and controversial thematic issues. One major challenge was the desire to move beyond established regional groupings and develop overarching narratives. At times, this proved rather difficult as the level of investigations between regions and islands differs greatly and because different regional island clusters often had strong affinities with contrasting mainland or large island trajectories, such as Greece, Turkey and Crete. The Ionian Islands, by virtue of their location and close ties with Italy, and Euboia, culturally virtually part of the Greek mainland, are not core to this book though major findings are referenced where appropriate.

Chronologically, this book covers the entire prehistoric period from the earliest Palaeolithic finds to the demise of the Mycenaean civilisation in the Late Bronze Age III period (Figure 0.2). Within each chapter readers will first find a synthesis of the archaeology and key themes relevant to the particular period under discussion. This is followed by a 'contextualisation' section which deals with the bigger overarching issues and themes, often drawing explicitly on key theoretical concepts and debates. Thus, this book is designed to be versatile and meet the needs of diverse audiences. While it can be used as a textbook to accompany an entire course on the Aegean Islands, individual chapters offer period-based summaries for broad overview courses. Finally, the contextualisation sections present more in-depth analysis of particular issues and debates and could serve as starting points for thematic seminars.

However, we should not forget the many books and articles on the Aegean Islands which have laid the foundations for this book. They generally fall into one of the following three categories: 1) overview books/articles on the Cyclades covering multiple periods (Barber 1987; Davis 1992; Davis et al. 2001; Ekschmitt 1986); 2) period-specific publications (Broodbank 2000a; Rambach 2000; Alram-Stern 1996, 2004); and 3) handbooks/companion books on Aegean archaeology with individual overview chapters on the Cyclades (other islands are generally only mentioned in passing) (Dickinson 1994; Shelmerdine 2008; Cline 2010). As excellent, thorough and insightful as they are, they unfortunately suffer from one

Period	Approximate dates
Lower Palaeolithic	1,300,000–250,000 BC
Middle Palaeolithic	250,000–40,000 BC
Upper Palaeolithic	40,000–9,000 BC
Mesolithic	9,000–6,500 BC
Aceramic Neolithic	6,500–6,000 BC
Early Neolithic	6,500–5,800 BC
Middle Neolithic	5,800–5,300 BC
Late Neolithic	5,300–4,200 BC
Final Neolithic	4,200–3,200 BC
Early Bronze Age	3,200–2,100 BC
Middle Bronze Age	2,100–1,700 BC
Late Bronze Age I–II	1,700–1,420 BC
Late Bronze Age III	1,420–1,075 BC

Figure 0.2 Aegean chronology.

or more of the following drawbacks making this current synthesis a timely one: most deal exclusively or predominantly with the Cyclades and often pay less attention to other island regions. Many were published over a decade ago and thus lack detailed discussions of more recent excavations and, in particular, new work on Mesolithic and Palaeolithic sites. Finally, more up-to-date publications are generally compendium books whose chapters can, by their very nature, only serve as an overview.

While there is a real academic need for a book like this, this endeavour is, above all, a love-letter to islands. I and many colleagues have long been fascinated by islands and have therefore made islands our archaeological home that we study, analyse and interpret. We are not alone in this obsession which has been a feature of scholarship since the 18th century "Islomania", as John Gillis in *Islands of the Mind* reminds us, "in its many different guises is a central feature of Western culture, a core idea that has been a driving force from ancient times to the present. [. . .] Western culture not only thinks about islands, but thinks *with* them" (2004: 1; emphasis in original).

Indeed, references to islands generally were common already in antiquity. Explorations of the world by the major colonial powers, especially of apparently pristine tropical lands, led to a revival of our fascination with islands in the 18th and 19th centuries (Grove 1995) with islands becoming a popular literary trope in the late 19th century (Loxley 1990). Islands elicited a range of emotions among contemporary writers and explorers that ranged from the very negative (places of isolation, fear and danger where primitive people follow primitive practices) to the naively positive (untouched tropical paradise beyond the shackles of modern-day urban existence). Both views have found expression in literature, radio and television. Golding's *Lord of the Flies* (1954), for example, captures the fearful view of islands magnificently by demonstrating how isolation from society's morality and rules transforms a group of English schoolboys into savages. In contrast, Daniel Defoe's *Robinson Crusoe* (1719),

stranded on an uninhabited island, learns to adapt to his isolation without ‘succumbing’ to primitivism. Modern reality TV shows have made use of the tension between utopia and dystopia by locating the competitors on beautiful but remote and isolated islands (e.g. *Survivors* on the island of Pulau Tiga near Indonesia and *Castaway* on Taransay in the Outer Hebrides). Sometimes isolation was the primary reason for choosing an island environment, as is the case for prison islands: Napoleon, for example, was banished to Elba and St Helena, while members of the Italian mafia are still sent to exile on the islands of Linosa and Asinara (King 1993).

At the same time, there “still remains a fascination for islands as tropical paradises, perhaps a Utopian ideal, where one could escape the rigours of urban existence” (Rainbird 1999: 219). The most famous example of this genre is probably de Vere Stacpoole’s *The Blue Lagoon* (1908) which reached an even greater audience when it was adapted to film by Randal Kleiser in 1980. Alex Garland’s *The Beach* (1996) is a more recent example of such a tropical paradise; however, it also highlights that such a paradise does not come without great costs. Without doubt, it is this positive image of islands that appeals to so many of us when we are studying holiday brochures which offer a stress-free lifestyle in unpolluted and romantic surroundings on our chosen island paradise (Baum 1997).

Islands thus capture and reflect back upon us our innermost desires, and it is therefore no surprise that they have become one of the most popular holiday destinations. Their ability to entice us visually and viscerally is beautifully demonstrated by the “I left my heart in the Aegean Sea” blog: in 2003, an engineer working in Taiwan published 124 of his holiday snaps from the Cyclades on his blog to share with his friends. Almost instantly the website became an online phenomenon. Six thousand visitors on the first day turned into one million visitors after the first month. Nearly two million visitors had viewed the blog over the first six months. Eventually, the pictures were commercialised through a photo book, desk calendar and jigsaw. More importantly, however, an analysis of the blog comments themselves indicated a deeply felt desire by 40% of those who had read it to visit the Cyclades in that year or in the near future. In several cases, the longing was so pronounced that a trip had already been booked (Lin and Huang 2006). And who could blame them!

THE BOOK’S STRUCTURE

The book’s structure is designed to serve the needs of different user groups and, for this reason, each chapter is self-contained. Those wishing to explore the history of the Aegean Islands in chronological order, from the earliest Palaeolithic to the end of the Mycenaean periods, are invited to read the book chapters sequentially. Readers wishing to gain a better grounding in one or two periods will find all the information they need in the relevant chapter(s). Major debates and issues are tackled in the ‘contextualisation’ sections which, while they draw on the background information presented in the chapter, are essential independent. Broadly speaking, the book is divided into two sections: 1) Chapters 1 and 2 provide vital historic and environmental background information and 2) Chapters 3–9 deal with specific chronological periods. Due to its great importance for archaeology and dating, Akrotiri on

Thera and the debates around the dating of the volcanic eruption are discussed over two chapters (Chapters 7 and 8).

Chapter 1 outlines the broader history of the Aegean Islands and history of archaeological discoveries through time. It reveals how the Aegean Islands had been a historical, political and economic backwater for much of the Byzantine, Venetian and Ottoman periods. This changed in the 18th and 19th centuries when more travellers were visiting the islands to explore the archaeological and mythological roots of the Classical Greek civilisation. Prominent visitors were Wheler, Spon, Tournefort, Murray and Bent. From the 19th century onwards, the Greek islands became ever more popular holiday destinations for northern Europeans. Within this context, archaeological investigations began in earnest in the 19th century. Fouqué explored Thera and discovered Akrotiri. Tsountas excavated many Cycladic cemeteries, and foreign schools played a major role in excavating iconic sites, such as Phylakopi on Melos, Ayia Irini on Kea, Heraion on Samos, Serraglio on Kos, Ialysos on Rhodes – to name but a few. From the 1970s onwards, field surveys became increasingly popular, making the Aegean Islands one of the best-researched regions in the world. The downside of this attention has been the attraction of the islands for thieves, looters, grave robbers and forgers – a topic explored in detail in the 'contextualisation' section. Unfortunately, looting of cemeteries and the creation of forgeries has been a major issue affecting, in particular, Early Cycladic marble figurines – many of which do not have a secure provenance.

The geological, geographic, climatic and ecological factors that effect the Aegean Islands are discussed in Chapter 2. The most important impact resulted from the changing sea level which gradually increased from −120 m to −7 m in the Middle or Late Bronze Age, increasing distances between islands and reducing the coastal flats. Tides and currents are relatively unimportant for journeying across the Aegean Sea. In contrast, winds, like the strong northerly *meltemia*, can reverse currents and had the greatest effect on seafaring. Navigating was comparatively easy with most islands in sight of each other and one would expect travel in any direction at any time of year. Following the last glacial maximum, the Aegean gradually developed its current hot, dry climate. Soils are poor in nutrients, but sufficient for Mediterranean agriculture. Rainfall is sufficient for cultivation. The islanders drew on the typical Mediterranean crops, such as cereals and pulses, supplement by fruits and nuts. Domesticated goat/sheep were by far the most commonly consumed animals; pig and cattle were rarer. Wild plants and animals as well as fish and molluscs were supplementary foods only. The health of the prehistoric islanders was impacted by access to food, living conditions and medical knowledge, but life expectancy was generally short and child mortality was high. The 'contextualisation' section shines a light on biogeographic paradigms that have become so influential to our interpretation of islands. Many scholars agree with Evans' concept of 'islands as laboratories' and consider islands to be isolated units that aid analysis and interpretation. Others consider islands permeable entities and any isolation a cultural strategy rather than a facet of their geography. Depending on a scholar's theoretical affinities the Aegean Islands have therefore been interpreted as either closed or open.

Chapter 3 summarises evidence for the Palaeolithic and Mesolithic periods in the Aegean Islands and beyond. It appears that the first hominins arrived in Greece in the Lower or Middle Palaeolithic,

though firmly dated evidence of *Homo heidelbergensis* or Neanderthals is rare. By the Upper Palaeolithic *Homo sapiens* was fully established. Palaeolithic and Mesolithic findspots are caves and open-air sites, such as Petralona, Kokkinopilos, Apidima, Theopetra Cave, Asprochaliko Cave, Lakonis Cave 1, Kalamakia Cave, Kleisura Cave, Franchthi Cave, Sidari on Corfu, Maroulas on Kythnos and Cave of Cyclope on Youra. With sea levels of −130 m, many islands were conjoined with the mainland. The central Cycladean Island joined together many of the later Cycladic islands. Given the island location of finds, scholars debate whether early hominins diffused accidentally or planned their island journeys. During the Mesolithic period, island living becomes more common. From Franchthi Cave in the Argolid we know that inhabitants utilise a wide range of nearby terrestrial and marine resources, including tuna. Obsidian from Melos also makes its first appearance on the Greek mainland, indicating that people now dwell permanently or seasonally on islands and make long journeys to procure obsidian – most likely using rowing or paddled boats made of reed, hide or wood. The 'contextualisation' section looks at the theoretical models that have been drawn on to understand the why and how of island colonisation.

During the Neolithic period, the topic of Chapter 4, people were beginning to settle in the Aegean Islands and experience an entirely new way of life that is based on cultivated crops and domesticated animals, the so-called Neolithic package. The oldest aceramic Neolithic layer, Stratum X, is found at Knossos, Crete and its 'Neolithic package' is already fully developed. Early Neolithic settlement can be found on the northern and eastern Aegean Islands. Clay vessels as well as domesticated animals and cultivated plants are now evidenced. The main sites from the Middle Neolithic are the Cave of Cyclope on Youra and Ayios Petros off Kyra Panagia island. Among notable finds are clay figurines, beads and stone tools. During the Late and Final Neolithic, most of the Aegean Islands are settled permanently for the first time. The two best known cultural groups are the Saliagos culture (Late Neolithic) and the Attica-Kephala culture (Final Neolithic). Saliagos settlement (off Antiparos) is well known for an impressive range of stone and clay figurines, most notably 'The Fat Lady of Saliagos'. In addition to cereals, pulses and sheep, the inhabitants specialised in the hunting of tuna. Kephala on Kea has the earliest extramural cemetery. Other important sites are Zas Cave on Naxos, Ftelia on Mykonos and Strofilas on Andros. The latter has rock carvings of ships and other maritime activities that speak to the ethos of seafaring and regular interaction between islands and regions. Obsidian from Melos is distributed widely across the Aegean Islands and was probably extracted by itinerant traders, rather than specialists. Metallurgy appears for the first time, being sourced locally from Lavrion and Siphnos. In the 'contextualisation' section, we look in more depth at the dramatic change from hunter-gatherer to sedentary farmer and ask how this change relates to island settlement.

Chapter 5 covers the Early Bronze Age. Key sites are Markiani on Amorgos, Grotta on Naxos, Skarkos on Ios, Kastri on Syros, Dhaskalio-Kavos on Keros, Koukounaries on Paros, Poliochni on Lemnos, Thermi on Lesbos, Emborio on Chios and the Heraion on Samos. Settlement patterns gradually move from a dispersed to a nucleated scenario in the Middle Bronze Age. House plans range from circular to rectangular/megaron, while the corridor house becomes particularly popular on the mainland. Fortified settlements, such as Palamari on Skyros and Panormos on Naxos, become particularly widespread in the Early Bronze Age II period and signal a period of unrest. Gradually, towns in the northeastern Aegean Islands are developing an urban character which is apparent from the many waste water installations,

elite houses, street systems, fortification systems, communal halls and settlement planning in general. People were typically buried in cist tombs in designated cemeteries, many of which have been excavated. The two largest cemeteries are Chalandriani on Syros and Agrilia on Ano Kouphonisi. The most iconic objects from the Early Bronze Age are the Cycladic marble folded-arm figurines which were normally found in association with funerary contexts, although their precise funerary function is debated. An even greater puzzle are the so-called Cycladic frying pans. Metals like copper, lead and silver play a major role in this period and were moved widely across the sea between processing stages. The main metal sources were the islands of Siphnos (copper, silver, lead), Kythnos (copper), Seriphos (copper) and Lavrion (copper, silver, lead) on the Greek mainland. The Early Cycladic II period (Keros-Syros culture) represents the most mobile and cosmopolitan phase in the islander's prehistory (what Renfrew (1972) has called the 'international spirit'), supported by the existence of longboats that could traverse the Aegean within just a few days to reach the Greek or Turkish mainlands. The contextualisation section looks in more detail at the changing pattern of connectivity between islands.

From the Middle Bronze Age onwards, the islands adopt a range of Minoan objects, technologies, ideas and, sometimes, religious practices. This phenomenon is called Minoanisation and is discussed in Chapter 6. Key sites are Ayia Irini on Kea, Phylakopi on Melos, Akrotiri on Thera, Mikre Vigla on Naxos, Kastri on Kythera, Trianda on Rhodes, Serraglio on Kos and Koukonisi on Lemnos. Minoan pottery imports are extremely popular across the Aegean and inspire much local imitation. Alongside Minoan-style pottery, local ceramic traditions continue – the most recognisable are Dark Burnished and Cycladic White. Minoan influence is visible also in other spheres and miniature friezes and large-scale frescoes can be found depicting naturalistic and figurative art. Lead balancing weights, suggestive of regular trade, have been found in the Cyclades and on Crete. The Cretan Linear A script is used in the islands and indicates the actual utilisation of writing and administrative practices. The Temple at Ayia Irini provides glimpses into religious practices. Particularly important is the discovery of large clay statues on stone votive platforms. While the statues themselves are reminiscent of Minoan figurines, their size is uniquely Cycladic. An undisputed Minoan peak sanctuary was founded on Kythera, but others may be present also on Kea, Naxos and Rhodes. Other Minoan ritual features present on the islands are pillar rooms (Phylakopi, Ayia Irini) and lustral basins (Akrotiri). At Akrotiri we can also find many portable finds that point towards the adoption of Minoan ritual practices, including offering tables, horns of consecration and libation vessels. The contextualisation section explores the models and interpretations that have been put forward to explain the phenomenon of Minoanisation. The key contributions are the Western String model, the Colonies classification scheme and the 'Versailles effect'. The notion of a Minoan thalassocracy ('rule of the sea') is considered an unlikely scenario. In contrast to these general constructs, recent approaches instead emphasise the specificity of each island's relationship with Crete.

Chapter 7 summarises the findings from the excavations of Akrotiri on Thera, the 'Pompeii of the Aegean', a Late Minoan IA/Late Cycladic I settlement that had been entirely covered by volcanic ash. The site was occupied since the Neolithic. Portable objects and rock-cut chambers are known from the Early Bronze Age. The Middle Bronze Age town was probably already substantial in size with paved streets and a drainage system in place. The inhabitants were fond of Minoan culture and part of the pottery production became Minoanised, although links with the Greek mainland and other Cycladic islands

existed too. Minoanisation became every stronger in the Late Bronze Age. During the Late Bronze Age, Akrotiri was a prosperous harbour town with many large, carefully constructed multi-storey buildings erected along a well-organised street network and connected to a public drainage system. The most famous houses are the West House, House of the Ladies, Sectors Alpha, Beta, Gamma and Delta, Xestes 2, 3, 4 and 5. Many houses have distinct architectural features, such as the Minoan polythyron and lustral basin. Many contained storerooms and workshops; mill installations are commonly found as are rooms for textile working. Objects inscribed with Linear A – including tablet fragments – attest to some degree of literacy and the use of a writing system for administrative purposes. Lead weights indicate the use of a metric system. Frescoes adorned many walls. The most famous examples are the "Fishermen", "Priestess", "miniature frieze" (with the "Flotilla" scene), "Boxing Boys", and "Adorants", "Naked Boys", "Saffron Gatherers" and "Mistress of Animals". In the contexualisation section we explore the impact of the volcanic eruption upon regional trade networks.

The geography of Thera and chronology of the famous Bronze Age eruption are discussed in Chapter 8. The eruption took place in the Late Minoan IA/Late Cycladic I period and was the largest in the last 10,000 years; it has been classified as > 7 on the Volcanic Explosivity Index (VEI) score. Following an earthquake, the inhabitants of Akrotiri rebuilt their town, but left it for good shortly before the fatal eruption. The eruption occurred in three or four phases and covered the island in 60 m of ash and lava. The impact of the eruption was widespread: ash deposits have been found on Greek islands, Crete and Turkey, large pumice rafts floated around the Eastern Mediterranean, tsunamis quickly reached Crete and the Levantine coast and Egypt. Most likely, the northern hemisphere experienced a degree of cooling, the so-called volcanic winter phenomenon. As regards dating the event, scholarship is divided into those supporting the 'high' chronology (which relies on radiocarbon dates) and those believing in a 'low' chronology (which is based on historic synchronisms with other cultures, most predominantly Egypt). Dendrochronology and ice core evidence have contributed greatly to the debate but remain currently inconclusive. Radiocarbon evidence of short-lived samples as well as the infamous olive tree found buried underneath the ash supports a 'high' chronology date in the late 17th century BC. The contextualisation section investigates to what extent (if any) the eruption could be considered the cause for the demise of the Minoan civilisation. The section concludes that the dating incontrovertibly denies a direct causal link between the eruption and the decline of the Minoan civilisation. However, scholars believe that long-term socio-political, economic and psychological effects of the eruption may have contributed indirectly to the Cretans' demise.

Chapter 9 looks at the Mycenaean period. During the Late Helladic III period, Mycenaean influence is pervasive across the entire Aegean and leads to the impression of a shared cultural repertoire, a so-called *koine*. Key sites are Grotta on Naxos, Phylakopi on Melos, Ayia Irini on Kea and Trianda on Rhodes. The megaron, a central administrative building, is evidenced at Phylakopi and Koukounaries and shows the adoption of a palatial architectural design in the islands. 'Cyclopean' fortification walls can be found at Koukounaries on Paros, Phylakopi on Melos and Ayios Andeas on Siphnos. Mycenaean-type chamber tombs and tholos tombs are found across the islands, including several warrior graves. Evidence of religion is limited to the Sanctuary at Phylakopi and the Temple at Ayia Irini on Kea. The 'Lady of Phylakopi', a large clay figure of a goddess with upraised arms, stands out among the human

and animal figurines. Much of the exported Mycenaean pottery was mass-produced in workshops in the Argolid. The most popular types are the kylix, stirrup jar, piriform jar and alabastron which have been found on all the Greek islands, Cyprus and even in the Near East. Towards LH IIIB we witness a time of increasing instability and the eventual collapse of the Mycenaean palace society on the Greek mainland by LH IIIC. This period sees an influx of migrants to the Dodecanese, Cyclades, Chios and Cyprus. The export of true Mycenaean pottery has now declined dramatically; instead islands are producing Mycenaean pottery locally alongside their own indigenous traditions. The final contextualisation section looks at the deep impact that Mycenaean art, culture and lifestyle had across the Aegean, and asks whether this was due to colonization, migration or emulation.

The book concludes with some thoughts on key themes, tropes and patterns that are woven into the fabric of our prehistoric island world.

1

THE AEGEAN ISLANDS THROUGH TIME

Thanks to a long history of archaeological excavations and surveys, the Aegean islands have become one of the best explored regions in the Eastern Mediterranean. This was not always the case. In 1964, Vermeule's book entitled *Greece in the Bronze Age* devoted less than 16 pages to the entire prehistory of the Aegean islands. It was Renfrew's monograph *The Emergence of Civilisation* (1972) where the islands first took centre stage alongside the Greek mainland and Crete. In this seminal monograph, Renfrew offered the first systematic synthesis of archaeological evidence and developed models to explain the emergence of civilisation in the Aegean. Since then, a number of important publications have provided summaries of specific island regions and/or periods – most commonly focusing on the Cyclades. They include Barber's extremely thorough, though now somewhat out of date, overview of prehistory in *The Cyclades in the Bronze Age* (1987). More recently, Broodbank's *An Island Archaeology of the Early Cyclades* (2000a) has focused on the relationship between islanders and the sea, and has thus helped reshape our understanding of Early Bronze Age island communities. Review articles by Davis (1992; Davis et al. 2001) provide timely summaries of discoveries from all the Aegean islands. In addition, there are several German scholars who have written important syntheses on the Cyclades (Ekschmitt 1986; Rambach 2000; Alram-Stern 2004). Syntheses aside, scholars from a wide range of countries for example, Greece, UK, Italy, Germany, France and the USA, have worked tirelessly to publish their findings and analyses in books and articles. As a consequence of archaeological investigations and scholarly publications we not only have a much better understanding of artefact categories, individual sites, chronological synchronism and regional patterns, but researchers have also expanded our chronological range. When we previously thought that the first islanders arrived in the Neolithic, we now know that it was Palaeolithic and Mesolithic inhabitants that first called the islands their home. In writing this textbook, I have tried to incorporate insights from all the available literature. However, recognising that not all readers will have knowledge of multiple languages, I have prioritised articles and books published in English when providing references.

PILGRIMS, TRAVELLERS AND TOURISTS

When chatting with archaeologists working on Greek islands, there is little doubt that one of the attractions is the very fact that their chosen research area is an island space rather than a mainland location. However, this fascination many of us archaeologists feel about islands was not always shared and our current love for islands was preceded by indifference or even hostility as can be seen when we trace our engagement with the Aegean islands back through time from the modern world to the split of the Roman Empire.

As a consequence of the split of the Roman Empire, the rise of Christianity and the eventual religious schism in 1054 that divided Christendom into a Western Latin and an Eastern Orthodox half, Greece became an intellectual and political backwater. Knowledge of the Greek language, philosophy and classical culture practically died out in the West, as Latin learning and culture became the new foundations of society. Western familiarity with Greek geography also waned as biblical locations were given greater prominence on maps, and travellers from the West no longer visited Greece (Vin 1980). Instead, ecclesiastical and secular envoys, merchants and an ever-increasing number of pilgrims travelled *through* Greece on their way to the Holy Land during the Byzantine and Venetian eras (ca. 11th to 16th centuries). There were two dominant routes: a northern one through Thessaly and a southern one through the Aegean Sea. Of the two routes, the southern one was more popular and took travellers from Italy through the southern Aegean Sea with scheduled stops at Kythera, Crete and Rhodes (Eisner 1993; Vin 1980; Malamut 2004). Along this route, it is likely that pilgrims may have stopped at some of the other islands to supplement their water and food provisions. However, traces of these visits are scant in literary sources.

It is only towards the end of the 14th century (particularly through the influence of the Italian Renaissance), that Western scholars began to appreciate the cultural importance of Byzantine Greece again and developed an interest in the classical Greek past (Eisner 1993; Vin 1980: 131–161). Travel to Greece itself (with the aim of exploring and recording its antiquities) is first documented in the 15th century with the *Commentarii* by Cyriac of Ancona (Bodnar and Foss 2004) and the *Liber Insularum Archipelagi* by Cristofero Buondelmonti (1824 [1420]). Buondelmonti mentions 75 islands in total, although he did not actually visit all of them. He also prepared the first detailed maps of the region and individual islands (Figure 1.1), which he presented to Cardinal Orsini in 1420. In addition to providing the very first maps of the Aegean islands, Buondelmonti was also interested in the ancient archaeological statues and temples which he describes in detail and interprets according to ancient Greek mythology (1824 [1420]).

From the late 15th century AD onwards, the Aegean islands began to be conquered by the Ottomans. First were the northeast Aegean islands, then the Dodecanese and Cyclades with the last, Tinos, surrendering in 1715 (Davies and Davis 2007: Fig. 1.1). Initially, few of the islands were under direct Ottoman administration and most were controlled indirectly through intermediaries of the local Greek elites. Over time, however, all the islands became incorporated into the Ottoman administrative organisation. Because they were often ruled from a distance, the Cyclades suffered greatly from pirate attacks in addition to

Figure 1.1 Cristoforo Buondelmonti, *Liber Insularum Archipelagi* (1420). The island of Melos, Greece (Wikimedia Commons, 2016).

having to pay their annual taxes (Davies and Davis 2007; Slot 1982). Despite ongoing pilgrim traffic through the region, the Ottoman conquest and dangerous travel conditions made the islands unattractive to travellers, and the still tenuous links with the West were interrupted for over a century. From 1580 onwards, however, the Ottoman Empire granted more administrative, financial and religious liberties to the Cyclades (Slot 1982), and this provided the foundation for the slow resumption of travel to the islands. Travellers to the islands – among them De Thevenot (1686), Struys (1683), Wheler (1682), Spon (1724) and Randolph (1687) – wrote travelogues that reported observations on a wide range of subjects, such as geology, fauna, flora, agriculture, archaeology and local customs (Figure 1.2). Such reports were eagerly consumed by contemporaries living at home and unable to travel themselves (Augustinos 1994).

In the 18th and 19th centuries, mounting interest in ancient texts and the discovery of archaeological remains resulted in a growing fascination by Western 'gentlemen scholars' with Greece, its inhabitants and heroic ancient roots (Eisner 1993: 71–82). It is the art historian Johann Joachim Winckelmann who best illustrates the desire to elevate the Greeks to an ideal. In his influential *Geschichte der Kunst des Alterthums* he declared Classical Greek sculpture the pinnacle of artistic achievement, brought about by the superior humanity of the Greeks (1764). Embracing Greek heritage as the intellectual and cultural roots of Western civilisation resulted in increased travel by British, French and German writers and painters (Eisner 1993; Tsigakou 1991; Wills 2007). Initially a privilege of young male aristocrats, by the 18th century foreign travel had opened up also to the middle classes. Although Greece had never been

> Monday morning, the ninth, we approached near Tine, and dropped anchor about noon in a Bay on the south-side thereof; there being no port on that side of the island. Tine was anciently called Τηνος, as by some medals were found there it appeared; which on one side bear the head of Jupiter Hammon, and on the other a bunch of grapes, denoting its plenty of wine, with these letters *T H*. Another I saw at Paris amongst the King of France's collections, which had on the one side the Head of the Emperor Alexander Severus, and on the other a trident, wreathed about with a serpent, with these letters about it THNIΩN, because here was a noble temple dedicated to Neptune; where, as Strabo relateth, the adjacent islands used to perform the ceremonies of their religious superstition.
>
> The whole island lieth high, being a large heap of marble rocks; but in many places covered with fertile soils. On the south-shore was its ancient city; where nothing now remains, but two or three houses, called still Πολη, or the City. […]
>
> The inhabitants of Tine employed themselves in the working their own silk, and that of Andros; but they are not great artists in that trade. The women knit great part of it into stockings, and sell them very cheap. Silk is worth about six or seven shillings the pounds. There is plenty of fresh water about the island, although not in the town; and it did therefore bear the name sometime of Hydrissa. The plants I took notice of more particularly here, were these: 1. Limonium, or, as Gerard calleth it *Limenonion, folio sinuato,* or *Sea-lavender with indented leaves*; […]. 2. Another thorny shrub, which I know not under what species to rank, unless Jacea. It riseth from the ground in a thick, round bush, its branches hard and woody, dividing it self still into an infinite number of other small brances, which terminate in thorns. […]

Figure 1.2 Excerpt from George Wheler 1682. *A Journey into Greece*. Cademan: London, pp. 51–52.

part of the Grand Tour schedule, an ever-increasing number of travellers began to visit Athens and the Peloponnese to study the remains of an idealised ancient Greece. Most visitors restricted themselves to the Greek mainland; only those willing to forego some comforts in an effort to explore lesser-known regions ventured to the islands (Black 1985). Among these were Tournefort (1718), Riedesel (1774), Choiseul-Gouffier (1783) and Savari (1788). Similarly to writers of the 7th century, these travellers described and sketched ancient remains as diligently as they noted down observations about local dress, customs, religious rituals, and commented on climate, geography, agriculture and commerce.

Closure of established travel routes and destinations during the Napoleonic Wars (1796–1815) increased the flow of travellers to Greece. Most of the visitors limited their exploration to mainland sites, but an increasing number began to visit the Aegean islands. These included Sonnini (1801), Chateaubriand (1814), Fiedler (1841), Murray (1845) and Bent (1885) who reported on local customs, interesting anecdotes, agriculture, industry, nature, history and archaeology (Figure 1.3).

The building of railways in France and Austria in the 1820s as well as Italy and Spain in the 1860s and the construction of a railway line and 'motorway' between northern Greece and Attica in Edwardian times made access to Greece much easier (Pemble 1987: 29–33). Nevertheless, travel to the Aegean islands remained challenging well into the 20th century as travellers had to overcome considerable hardship during their island journeys. Travel was physically demanding, living conditions basic, supplies difficult to replenish, illnesses frequent, pirate attacks possible, boats in a poor state of repair and heavy winds could enforce long waiting periods (e.g. Bent, M.V.A. 2006 [1885–1889]) (Figure 1.4).

As we landed on Melos the sun was 'seeking his kingdom in flames of blood' as a Greek peasant would say; […] The Kastro and the surrounding villages are built of a light stone, which takes a darker colour in the air, having somewhat of a ginger-like appearance; it is excellent for sharpening iron upon, and is undoubtedly the pumice of the ancients, which Pliny mentions as being useful for softening the skin. About in the Kastro and villages there is still a good deal left.

Of the old costumes the headdress worn by many women is called, as at Kimolos, the κουρλι, but it is worn differently, being a thin white muslin veil tied round the chin and then bound round the head in crossing folds, and hanging down behind. Two curls appear or either side, and with a blue dress, and sometimes, though now rarely, a stomacher, we have the everyday dress of a Meliote woman. […]

As we wandered among the villages near the Chora, we found many interesting objects for observation. At Trypete, so called from the holes (τρυπι) or rather ancient tombs cut in the rock close to, we found them hard to work dancing this same Sunday evening. What inveterate dancers these Greeks are! […]

Cotton is a great industry in Melos, for every garment and every article of household use is made at home. The old women were just now engaged in putting the raw material through a small hand instrument called μαγγανος, which turns two rollers different ways; this is to free it from the seed. The next process is to beat it with a large bow (τοξευειν) made out of a bending reed stretched tightly with a cord.

Figure 1.3 Excerpt from Theodore Bent (2002) [1885]. *The Cyclades or Life Among the Insular Greeks*. Oxford: Archaeopress, pp. 29–38.

> […] And now we are storm-stayed on board the *Ydra* (ΥΔΡΑ) in the harbour of Vathy in Siphnos, since yesterday at 11 a.m. and no chance of getting away today. The steamer has bad engines, is small and it is very stormy. No post. No telegraph. So we fear our friends will be uneasy about us, we might as well be in the moon.

Figure 1.4 Excerpt from Bent, M.V.A. (2006) [1885–1889]. *The Travel Chronicles of Mrs J. Theodore Bent. Greece and the Levantine Littoral.* Vol. 1. Oxford: Archaeopress, p. 17.

At the same time, Greece took its first steps to becoming a destination for organised tourism. In 1833 it became included in package cruises to the eastern Mediterranean and tours by Thomas Cook and the HAPAG (Hamburg-Amerikanische-Paketfahrt-Aktien-Gesellschaft) package tours in 1891 (Brendon 1991; Kludas 2001). The first travel guidebook was published by the English publisher John Murray in 1845 (Figure 1.5); by 1900 the guidebook had been expanded to include route suggestions, coloured maps and a Greek-English vocabulary. Furthermore, the appointment of the Bavarian prince Otto in 1832 as the first king of the Greeks opened up Greece to German tourists (Eisner 1993: 126–128). Archaeological discoveries played a crucial part in uncovering ever more detail about the land that encapsulated the roots of Western civilisation. This heritage was the major attraction for travellers from northern Europe. This is beautifully encapsulated by the first motto of the National Greek Tourism Organisation, “You were born in Greece”. As excavations revealed ever more about the ancient past, the Greek mainland also became a desirable destination for study trips. In 1892, Dörpfeld, a German architect, organised the first guided culture tour to the islands during which more than 60 scholars and students of German, Russian, Italian, English, American and Greek nationality were introduced to their archaeology (Manatt 1914: 189).

It is only in the 1960s that the emphasis shifted from travellers interested in experiencing the ancient sites they had studied at home towards mass tourism with a predominant interest in beautiful scenery, relaxation and ‘getting away from it all’. In 1967, the Tourism Organisation of Greece recognised this change and altered their motto accordingly to “Having fun in Greece”, heralding major development in tourism which commenced in the mid-1970s. Between 1960 and 2002 the total number of tourist arrivals to Greece grew by an average of approximately 2.4% per year. In 1999, for example, tourism accounted for 6% of the Greek GDP and approximately 50–90% of the island/coastal regional gross product (Buhalis 1999). Following the onset of the worldwide economic crisis, Greece experienced a minor downturn (Dritsakis 2004). However, Greece has remained an incredibly popular holiday destination and was reported to expect record numbers of visitors in 2016.

Most of the visitors come from Europe, with Germany and the UK being the two largest contributors. Island and coastal areas are particularly geared towards tourism and have become ever more developed (Vlami 2010); Crete and Rhodes now receive almost 50% of all foreign tourists (Andriotis 2004; Coccossis and Constantoglou 2005). With unemployment in the insular regions below the national average and GNP higher than the Greek average, the most touristically developed islands now form the wealthiest region in Greece (Andriotis 2004). Unlike the medieval period, islands are no longer the backwater, but are decidedly in the centre of our appreciation and experience of Greece.

HANDBOOK FOR TRAVELLERS

IN

GREECE

INCLUDING

THE IONIAN ISLANDS, CONTINENTAL GREECE,
THE PELOPONNESE, THE ISLANDS OF
THE ÆGEAN, CRETE, ALBANIA,
THESSALY, & MACEDONIA;

AND

A DETAILED DESCRIPTION OF ATHENS,
ANCIENT AND MODERN, CLASSICAL AND MEDIÆVAL.

Fifth Edition

THOROUGHLY REVISED AND CORRECTED

IN TWO PARTS—PART I.

WITH MAPS AND PLANS

LONDON
JOHN MURRAY, ALBEMARLE STREET
1884.

Figure 1.5 Front cover of John Murray (1884, 5th ed.) *Handbook for Travellers in Greece*, London: John Murray.

A BRIEF HISTORY OF ARCHAEOLOGICAL EXPLORATIONS

The first serious archaeological investigation in the islands was undertaken by the French geologist Fouqué who had travelled to Thera in the 1860s to study the volcano (Tzachili 2006). The Suez Canal Company had recently begun mining for volcanic ash on Thera and the islet of Therasia, an essential ingredient needed for the high-quality cement used to construct the harbour and buildings at the newly established city of Port Said, Egypt. Thanks to this mining activity, the first prehistoric building remains were uncovered at Therasia, an islet off Thera, by a local doctor called Nomikos and the landowner Alafouzos. Recognising the importance of these finds, Fouqué expanded the excavations in 1867 and published them in his book *Santorin et ses Éruptions* (Fouqué 1879; translated by McBirney 1998: 96–104) (Figure 1.6). Small-scale excavations on Thera proper also revealed many discoveries, such as layers of pottery, two tombs, obsidian tools and gold rings near the village of Akrotiri (McBirney 1998: 104–107). We now know that, by following ravines and excavating where the ash layers were thinnest, Fouqué had accidentally discovered the famous Bronze Age town of Akrotiri. The French scholars Gorceix and Mamet continued Fouqué's investigations and also opened up new locations in the Akrotiri area where they uncovered substantial building remains, pottery, small finds, animal bones and fresco remains (McBirney 1998: 107–123).

The Yorkshireman James Theodore Bent travelled extensively in the Eastern Mediterranean, Middle East and Africa with his wife Mabel and published accounts of his journeys, including the well-known *The Cyclades, or Life among the Insular Greeks* (1885). Recognising that "in every island of the Aegaean [sic] Sea, [. . .] are found abundant traces of a vast prehistoric empire" (Bent and Garson 1884: 42), Bent regularly published his findings in the *Journal of Hellenic Studies*. Among his contributions are his investigations into ancient mining on Siphnos, the excavation of tombs on Karpathos, excavations on Samos and an article on his excavation of two cemetery sites on Antiparos where he opened around 40 Early Bronze Age graves with accompanying marble figurines and bowls (Bent and Garson 1884).

Towards the turn of the 20th century, Christos Tsountas undertook investigations and excavations in the Cyclades with the aim of learning more about this under-explored region. Tsountas has been dubbed the 'father of Greek prehistory' for his wide-ranging contribution to illuminating, especially, the Mycenaean, Early Cycladic and Neolithic periods. On behalf of the Archaeological Society of Athens, he explored archaeological sites – particularly the more easily visible cemeteries – on Paros, Syros, Amorgos, Antiparos, Siphnos and Despotikon. Recognising the uniqueness of the finds and their geographic focus, he was the first to consider the Cyclades as a distinct cultural unit distinct from mainland Greece and other island groups. His two seminal articles ('Kykladika' and 'Kykladika II') in the Greek journal *Archaiologiki Ephimeris* from 1898 to 1899 thus form the foundation of much of our knowledge of the Bronze Age Cyclades (Fitton 1996: 106–107). Klon Stephanos, a physical anthropologist, continued Tsountas' work in the first decade of the 20th century and excavated numerous cemeteries on Naxos, revealing hundreds of graves. The selection of the finds uncovered by these two men is displayed in the National Archaeological Museum at Athens.

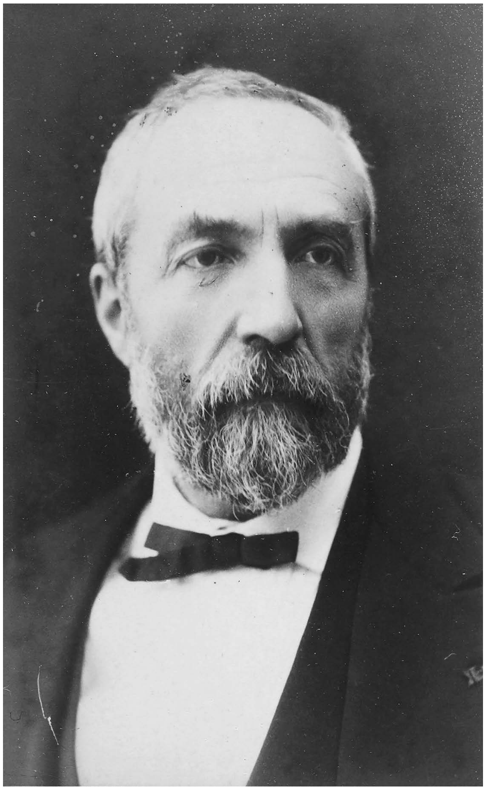


Figure 1.6 Ferdinand André Fouqué, 1883 (Wikimedia Commons, 2014).

However, not all finds went to Athens. Following the creation of the Greek state in 1830, the protection of antiquities and installation of museums had been recognised as a priority. The Greek Archaeological Service was founded in 1833, quickly followed by the establishment of the Archaeological Society in 1837. The remit of the latter was to assist the Greek government in the recovery and restoration of antiquities, and it did so by (co-)financing excavations, personnel and museums. Between 1886 and 1904 four museums were founded in the Cyclades – on Thera, Mykonos, Delos, Syros – as well as on the island of Aegina (Gazi 1993). Museums on other islands followed later: the Samos museum in 1912 and that on Lemnos in 1961, for instance (Mouliou 1997: 221–223).

The last decade of the 19th century also saw the first large-scale excavation project. The excavation of Phylakopi on the island of Melos by the British School of Archaeology, under the directorships of Cecil Smith and David Hogarth, took place between 1896 and 1899. Excavations of Phylakopi, a Bronze Age site hitherto only known from surface finds, revealed a substantial multi-period settlement with a large fortification wall (Figure 1.7). The results were swiftly published in a substantial monograph in 1904 (Atkinson et al. 1904). The original excavation is particularly well known for its detailed stratigraphy, the work of site supervisor Duncan Mackenzie, who went on to become a field supervisor at Sir Arthur Evans' excavations at Knossos on Crete (Brodie 2009). Foreign schools have been present

Figure 1.7 Plan of Phylakopi with excavated buildings from the Third City (Atkinson et al. 1904: Plate 2). Image reproduced with permission of the British School at Athens.

in Greece since the mid-1800s where they act as centres for fieldwork and research, and communicate with the Greek archaeological authorities on behalf of individual archaeologists. The first, the École Française d'Athènes, came into being in 1846; quickly followed by the German Institute in 1874, the American School in 1881, the British School in 1886 and the Italian School in 1910 (Fitton 1996: 108; Díaz-Andreu 2007: 105–110).

The early part of the 20th century saw much excavation activity in the islands – often undertaken by archaeologists associated with one of the foreign schools: the British School returned to Phylakopi during 1911 (Dawkins and Droop 1910/1911); German archaeologists uncovered prehistoric remains at Paroikia on Paros (Rubensohn 1917); a French team began excavations on Mt Kythnos on Delos, revealing an Early Bronze Age settlement there, later exposing also Middle and Late Bronze finds (Santerre 1958), and Italian archaeologists unearthed Bronze Age occupation layers at Vathy Cave in Kalymnos (Maiuri 1928; Benzi 1993).

In the Dodecanese and the northeastern Aegean, the Italian School revealed the prehistory of Serraglio, the main settlement on Kos, between 1935 and 1943 (Morricone 1972/73) and Ialysos on Rhodes between 1928 and 1949 (Maiuri 1928–1941). They also uncovered Poliochni on Lemnos in extensive campaigns between 1930 and 1936 (Della Seta 1933). In addition, a German team uncovered the existence of an extensive fortified Bronze Age settlement beneath the Heraion on Samos (Buttler 1935/36; Heidenreich 1935/36; Wrede 1935/36). On Chios, the English archaeologist Edith Eccles conducted excavations at Ayio Gala in 1938 and 1939 which were eventually published by Hood (1981/1982).

In the Cyclades, in contrast, the two world wars interrupted archaeological investigations until 1949 when Nikolas Kondoleon, Professor at the University of Athens, began excavations at the settlement of Grotta on Naxos. The excavations continued until 1985, initially by Kondoleon, then by his successor Lambrinoudakis (Fotou 1983). Further discoveries at Naxos included Early Cycladic cist graves and Late Bronze Age chamber tombs on the hill slope near Grotta (Kardara 1977). Kondoleon's work at Naxos has been regarded as of great importance, especially for the Mycenaean period in the islands (see Chapter 9), as it raised the question of whether the Late Bronze Age III funerary remains were those of locals imitating Mycenaean culture or Mycenaean immigrants – a debate that continues unabated into the present day.

Illicit excavations and legal construction works in the Cyclades necessitated countless excavations by the Greek Archaeological Service in the 1950s and 1960s. Given the financial appeal of grave goods for thieves, much of the excavators' work was focused on cemetery sites which had attracted the thieves' attention. Of particular interest to grave robbers were Cycladic marble figurines (Figure 1.8) which were so strikingly contemporary in their appearance that there was a growing demand for them in the international art market (see Chapter 5). The creation of museum collections across the world increased the demand even further. In addition to those that were extracted from graves, now irreparably damaged, were copies skilfully manufactured in ateliers in Paris or Greece (see Contextualisation section). As a consequence, it is not always clear whether figurines without a confirmed provenance are genuine or fakes. Despite the irreparable damage done, Christos Doumas – by drawing on his own and other colleagues' excavations – was able to publish the first major synthesis of Early Cycladic funerary architecture, finds and burial practices in 1977.

Figure 1.8 Marble Cycladic figurine (inv no 5107 National Archaeological Museum Athens) (Wikimedia Commons, 2015).

However, excavations also uncovered settlement sites, such as Kastri on Kythera, Kolonna on Aegina, Emborio on Chios, Panormos on Naxos, Kastri on Syros and Ayia Irini on Kea. Of these, Ayia Irini, a coastal site occupied almost continuously throughout the entire Bronze Age, provides an important comparison to Phylakopi. Excavated by John L. Caskey, Professor at the University of Cincinnati,

between 1960 and 1976, the site revealed a long stratigraphic sequence and a wealth of archaeological finds. A number of publications have already appeared. They include the Neolithic and Early Bronze Age periods (Wilson 1999), House A (Cummer and Schofield 1984), the Middle Bronze Age (Periods IV and V) (Davis 1986; Overbeck 1989), the western sector (Schofield 2011), balance weights (Petruso 1992), potter's marks (Bikaki 1984), specialised pottery (Georgiou 1986), the Temple statues (Caskey 1986) and the Late Neolithic settlement and cemetery of Kephala (Coleman 1977). Other volumes, most notably the full publication of the Temple, are still pending.

Of even greater impact was the start of systematic excavations at Akrotiri on Thera, nicknamed the 'Pompeii of the Aegean' for its outstanding preservation underneath substantial volcanic ash layers (see Chapters 7 and 8). Excavations began in 1967 under the directorship of Spyridon Marinatos. Following his death on-site in 1974, he was succeeded by Christos Doumas. The excavations have revealed a wealthy trading community with large multi-storey houses, diverse finds and, most famously, spectacular frescoes, and provided details on daily life that are irretrievably lost to us at other sites (Doumas 1983, 1992b). Aside from the archaeology, geologists and vulcanologists have explored the island's history extensively, their scientific progress charted by conference proceedings (Doumas 1978–1980; Hardy et al. 1990; Sherratt 2000a). The Middle and Late Bronze Age layers from many of these excavations revealed the great attraction of Minoan objects, technologies, ideas and even belief systems for islanders, placing the islands centre-stage for debates concerned with the so-called Minoanisation (see Chapter 6).

Originally located by Zapheiropoulos, but excavated by Evans and Renfrew in 1964–1965 is the site of Saliagos off Antiparos (1968). Together with Kephala on Kea, the two sites are dated to the Neolithic period and thus revealed the earliest evidence of permanent occupation of the islands (see Chapter 4). As the animals and cereals/pulses found were fully domesticated, it was assumed that travellers had brought the 'Neolithic package' with them as they journeyed from the mainland to the islands.

Further excavations and investigations in the 1970s and 1980s have added to our understanding of the islands and their interconnections with neighbouring regions. With more information now available, Renfrew was able to put forward the first major synthesis of the Aegean world in his seminal work *The Emergence of Civilisation* (1972). Interest in island cultures was not limited to archaeologists, but also captured the public's imagination. A major exhibition of Cycladic art at the Badisches Landesmuseum in Karlsruhe, Germany, in 1976 brought together artefacts from 79 European and American museums and collections (Thimme 1976). The first exhibition of the Goulandris Collection, a Greek collection dedicated to early Cycladic art, went on display in 1978 and subsequently travelled to Washington, D.C. and Houston in the USA, Tokyo and Kyoto in Japan, Brussels in Belgium, London in the UK and Paris in France. Another major exhibition of Cycladic art was mounted in the USA in 1987 and travelled between Virginia, Texas and California. The appeal of Cycladic art has not waned since as visitor numbers for the Museum of Cycladic Art in Athens (which incorporates the Goulandris Collection) demonstrate (Mouliou 1997).

The British School returned to Phylakopi on Melos in the 1970s for several years of limited excavations and a surface survey of the island that explored the island's history through time (Renfrew and Wagstaff 1982; Renfrew et al. 1985; Renfrew et al. 2007a). The most important discoveries by this team

were the dating of the fortification wall, the recognition of a Late Bronze Age III shrine complex and the existence of a Mycenaean megaron above the Late Bronze Age mansion. Two well-fortified Late Bronze Age III sites were investigated at Ayios Andreas on Siphnos (Philippaki 1973) and Koukounaries on Paros (Schilardi 1979, 1984). At the same time, abandoned excavations were revived in many locations and old collections revisited and re-analysed, constantly increasing our understanding of the past.

Alongside excavations, a wave of intense survey activity since the late 1970s has ensured that the Aegean islands have become one of the best-researched locations in the world (Figure 1.9). Cherry lists no fewer than 50 surveys – many of which are interdisciplinary and multi-period in nature – in mainland Greece, the islands (i.e. Kea, Melos, Karpathos, Samothrace, Kythera) and Crete (2003: Fig. 9.4). Intensive survey projects have been conducted on Melos, Kea, Naxos, Keros, Kythera and Antikythera, while Amorgos, Andros, Ios, Kea, Kythnos, Makronisos, Mykonos, Naxos, Pholegandros, Syros, Karpathos, Saros, Kasos and Chios had extensive surveys undertaken (for references see Broodbank 2000a: 49–50; see also Melas 1985; Yalouris 1986; Bevan and Conolly 2013; Broodbank 1999; a searchable database of Greek survey projects that revealed Palaeolithic and Mesolithic finds is available through the Archaeological Data Service (Elefanti, Marshall and Gamble 2015)). It is not merely the quantity of research, but also the quality that makes the islands stand out. Broodbank, summarising survey and excavation data available for the Cyclades, classifies four out of the 14 larger Cycladic islands as 'well explored'

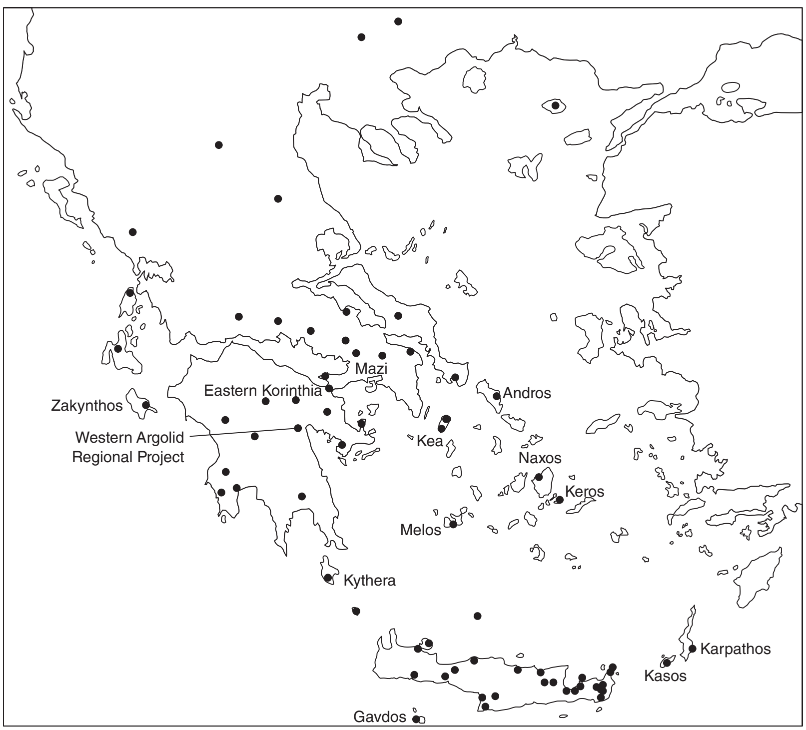


Figure 1.9 Key surface survey projects in Greece (after Cherry 2003; Driessen 2001) with additions.

(Kea, Melos, Naxos, Amorgos), eight as ‘moderate’ (Andros, Kythnos, Syros, Mykonos, Paros, Ios, Pholegandros, Thera) and only a few as ‘poor’ (Broodbank 2000a: 52). The rise of surveys reflects the scholars’ desire to place knowledge obtained through excavations of individual sites into an island-wide context and consider the bigger patterns, strategies and changes societies underwent through time. Surveys also provide greater understanding of developments across broader regions and contributed greatly to establishing synchronisms across space. However, there is no reason to be complacent as the focus of surveys has firmly been on the Cyclades, followed, at some considerable distance, by islands in the Dodecanese.

More recently, investigations on the Aegean Islands have brought to light exciting evidence of the Mesolithic and Palaeolithic periods, extending the known prehistory of the islands by thousands, if not tens of thousands, of years (see Chapter 3). Although not many sites are comprehensively published, it is now clear that the islands were visited and settled well before the Neolithic as was once assumed by scholars (e.g. Cherry 1981). The publications of Maroulas on Kythnos and the Cave of Cyclope on Youra (Sampson, Kaczanowska and Kozlowski 2010; Sampson 2008a, 2011) demonstrate that Mesolithic people were accomplished explorers who managed to voyage to islands, exploit local raw material resources and set up home. Upper Palaeolithic evidence is still very limited, but artefacts from this time period have been reported from various islands, including Lemnos, Thasos and Naxos.

At a workshop held in 2003, Aegean prehistorians took stock of the health of the discipline at the beginning of the 21st century. Their conclusions were reassuring as the data showed that the level of activity had remained relatively stable over the years and that scholars working on prehistoric topics contributed regularly to publications, participated in conferences and attracted PhD students (Cherry and Talalay 2005: Table 2.3; also Terrenato 2002). Of the 40 Gold Medals for Distinguished Archaeological Achievement awarded by the Archaeological Institute of America (AIA) between 1965 and 2014, 13 were bestowed upon Aegean prehistorians. Of these, John L. Caskey, the excavator of Ayia Irini on Kea, was a true island archaeologist, while George Bass and Lionel Casson specialised in the sea itself and explored shipwrecks and seamanship (Cherry and Talalay 2005: note 1, with additions). As regards research locations and themes, archaeology on the Aegean islands generally followed broader trends in Greek archaeology. Analysing data of publications by Greek archaeologists, Andreou (2005: fig 4.1) shows the shifting pattern of research emphases between 1952 and 2001. While it was the southern and central mainland that received the most attention in the 1950s, publications for this area has dramatically declined ever since; in contrast, Cretan research increased in prominence between the 1950s and 1970s, but then decreased considerably. Instead, articles discussing archaeology in northern Greece have seen an exponential increase, adding up to more than 50% of all article topics in the 1990s and reflect the emerging focus on Neolithic through Palaeolithic periods. As regards research into Aegean islands, the Cyclades were barely noted during the 1950s and 1960s but, following a number of large-scale excavation projects and surveys, have been regularly featuring in publications ever since, achieving between approximately 8% and 15% of the total Greek output. Articles about other islands have always been a minor contributor and rarely exceed 5%, indicating that much still needs to be done to bring them into the mainstream. With regard to research themes, Andreou argues that scholars of the 1950s and 1960s were indebted to a culture-historic approach with the aim of revealing physical evidence of past

island populations and establishing their chronological development through time and space. Drawing on broader trends in archaeological theory and practice, scholarly focus shifted to economic, political and social aspects of the islanders' life in the 1970s. The glut of surveys projects in the 1980s and 1990s reflects the desire to gain a more holistic understanding of islands – one that incorporates the hinterland and looks at broader habitation and interaction patterns. Since then, scholarly attention has shifted to ecofacts and, more generally, applying scientific techniques to archaeological study. The last decade has been dominated by a debate about chronology and (cross)dating alongside other archaeometric endeavours. The next decade is likely to retain the current focus on dating and involve a wider range of interdisciplinary research to reveal more about the social and economic life of prehistoric communities.

No doubt, much more is still to be done to gain a comprehensive picture of the islands' prehistory, especially their very earliest prehistory. Nevertheless, a glut of recent publications of past and recent excavations and surveys now allows for a better understanding of individual sites and cross-comparisons between islands and regions. Well-publicised work in English is becoming available from islands in the Dodecanese and northeastern Aegean, thus increasing ease of access to this scholarship. Last but not least, a recognition that dating is the cornerstone of all interpretation has given rise to ever greater use of radiocarbon dating. These dates are helping scholars to establish an absolute chronological frameworks for the island regions into which the relative chronologies derived from settlement sequences can be slotted. Davis' verdict is therefore even more true today than it was in 1992 when he wrote that "the Aegean islands should [. . .] be viewed [. . .] as one of the best-documented areas of prehistoric Greece, or even of prehistoric southern Europe" (Davis 1992: 756).

CHRONOLOGIES

Broadly speaking, scholars working in the Aegean employ two kinds of chronology: relative and absolute. A relative chronology is not fixed independently in time, but relies on stratigraphic sequencing of architecture or artefact types, styles, etc. relative to each other: layer A, the uppermost layer, can thus be considered to be younger in date than layer B that underlies it, and so on. Cross-dating between contexts or sites is based on stylistic similarities only. The sequencing of Minoan periods is a well-known example of such a relative chronology as Evans based his characterisation of each period on ceramic features, resulting in the division of the Bronze Age into Early, Middle and Late with additional sub-divisions (i.e. I, II, III, followed by A, B, C) as appropriate. The Helladic and Cycladic chronologies are based on similar concepts, though an alternative terminology based on cultural groupings, with designations such as 'Grotta-Pelos culture', is in use in the Cyclades (Warren and Hankey 1987). While giving structure to our archaeological assemblages, scholars have long recognised the disadvantages of relative chronologies as they give the illusion of certainty when the reality is much more complex and messy as variability and regionalisms abound. Also, a relative chronological framework is based on the assumption that all artefact types or decorative features change at predictable rates. This is not the case as some types may be more conservative and enduring while others are more precocious and constantly changing. There is no reason to believe that one style "starts [. . .] or ends on any wider basis on a given day, month, year,

or maybe even decade, and plural styles and interplays are possible, if not likely" (Manning 2010: 16). Furthermore, scholars have assigned different sites or regions different chronological markers, making cross-referencing difficult and, finally, a lack of stratigraphy – as often encountered in multiple burials – requires scholars to rely on cross-references (Manning 2010). Nevertheless, relative chronologies have remained the most practical and commonly used way of dividing up time. It is only over the last three decades that absolute dating techniques have become more systematically utilised.

There are two categories of absolute chronologies. The first utilises historic sources to date archaeological contexts (such as the lists of Egyptian pharaohs and Near Eastern kings or other officials). In the case of the Aegean, the dating of objects then relies on stylistic cross-matching with finds from Egyptian or Near Eastern contexts (e.g. Warren and Hankey 1987). The second type of absolute chronologies uses scientific techniques, most frequently radiocarbon dating, to date contexts or objects independently. This technique dates the time when an organic material stopped growing or died. To get the most precise dates, the organic item needs to be short lived, such as seeds from agricultural crops, rather than timber from long-living trees. Increasingly more and more precise dates are now becoming available, often with an accuracy of one century or even a few decades (Figure 1.10). With ever-increasing numbers of radiocarbon dates being added to our database, absolute dates are already helping scholars create a framework within which to slot existing relative chronologies. This process is not without conflict and friction as the new dates have highlighted discrepancies with existing relative chronologies with regard to period start and end dates and overall length of individual periods (Manning 1995, 2008, 2014; Manning et al. 2006); for those periods where scholars have raised major chronological questions, the issue is explored in the respective chapter.

The most prominent debate concern the Theran eruption. The eruption itself is firmly dated in relative terms to the mature Late Minoan IA period, but there remains disagreement on its absolute date (see Chapter 7). However, uncertainties about chronology transcend this unique event and extend to questions about the start and end dates of most Bronze Age periods and their sub-phases in the

Dates BC	Crete	Cyclades	Mainland
3100-3000	Early Minoan I	Early Cycladic I	Early Helladic I
2900-2650	Early Minoan IB	Kampos Phase	
2650-2450	Early Minoan IIA	Early Cycladic II	Early Helladic II
2450-2200	Early Minoan IIB	Early Cycladic III	Early Helladic II
2200-2100	Early Minoan III		Early Helladic III
2100-1925	Middle Minoan IA	Middle Cycladic	Middle Helladic
1925-1875	Middle Minoan IB		
1875-1750	Middle Minoan II		
1750-1700	Middle Minoan III (A-B)		
1700-1625	Late Minoan IA	Late Cycladic I	Late Helladic I
1625-1470	Late Minoan IB	Late Cycladic II	Late Helladic IIA
1470-1420	Late Minoan II		Late Helladic IIB
1420-1390	Late Minoan IIIA1	Late Cycladic III	Late Helladic IIIA1
1390-1330	Late Minoan IIIA2		Late Helladic IIIA2
1330-1200	Late Minoan IIIB		Late Helladic IIIB
1200-1075	Late Minoan IIIC		Late Helladic IIIC

Figure 1.10 Approximate absolute chronology for the Aegean Bronze Age (after Manning 2010: table 2.2)

Aegean. Different scholars are proponents of the High (also known as Long) or Low (also Traditional or Short) Chronology. Broadly speaking, scholars in agreement with the High Chronology believe that the younger dates provided by scientific dating methods are accurate while those following the Low Chronology base their dates on synchronisms with Egypt which gives much older dates (Åström 1987; Warren and Hankey 1987; Manning 2014). In practical terms, as absolute radiocarbon dates can have a substantial margin of error, scholars also normally state the period or sub-phase, e.g. Late Cycladic I, or even provide details of the actual site assemblage and level, e.g. Ayia Irini VII.

CONTEXTUALISATION: THE DESIRABILITY OF AEGEAN ART

Archaeologists excavate and study ancient artefacts and artworks to understand more about the lives of prehistoric communities in the Aegean. Such objects also have their intrinsic attraction which has led to many artefacts finding their way into public and private collections. Unfortunately, not all objects have been legally obtained and many derive from illegal excavations. Initially, state protection for archaeological finds was relatively weak. Soon after the Greek state was formed, the first archaeological law came into force in 1834. It was rooted in the understanding that private citizens and the state jointly owned antiquities discovered on private property. The law stated that, as long as the authorities were notified in advance and a list of objects found provided, private excavations were legal; objects uncovered on private land were to be shared between the landowner and the Greek state. In contrast, artefacts found on public land, on the seabed, rivers, etc. were property of the state. Finds uncovered on private land prior to the enactment of the law or already part of private collections belonged exclusively to their private owners. The law represented a first step towards creating a basic record of the archaeology excavated on private land, but a lack of finances and personnel made enforcement impossible (Galanakis and Skaltsa 2012: 638–639).

Despite regular announcements by the Greek state condemning unauthorised excavations, the wording of the 1834 law made it easy for landowners to stay within its bounds as long as they notified authorities in advance and only excavated with their permission. The law also granted them the right to sell the finds to the highest bidder – invariably art dealers or collectors. Alongside approved excavations, an industry of illegal digs grew up, spurred on by an increasing demand for antiquities by large European and American museums. It was only in 1893, with the passing of the expropriation law, when the Greek state began to impact on the supply of illegally obtained antiquities. This new law granted the Greek state permission to enforce the purchase of private land for the purpose of conserving or excavating antiquities. However, when it became clear that compensation payments to landowners were frustratingly slow, antiquities were often either destroyed or sold illegally (Galanakis and Skaltsa 2012: 640). Capps, Professor of Classics at Princeton University, eloquently describes the scale of the illegal industry in the 1890s:

> The Athenian dealers in antiquities have representatives in the principal capitals of Europe. They do business directly with the management of museums on both sides of the Atlantic, and openly claim to be able to fill orders for almost every variety of Greek antiques.
>
> (cited in Galanakis and Skaltsa 2012: 641; for an in-depth view of trafficking of antiquities from Amorgos during this time period, see Galanakis 2013)

A second, more stringent, archaeological law, Law 2646 'On Antiquities', was passed in 1899 which revoked the earlier notion of shared ownership of antiquities between private individuals and the state. The state had now become the sole proprietor of ancient finds. Private excavations were prohibited altogether, as only state authorities were permitted to excavate. Those in breach of the law could face imprisonment, heavy penalties and loss of political rights. Nevertheless, the law did not prohibit the sale of antiquities entirely. Those deemed unworthy to be held in Greek museum collections could still be sold within Greece (Galanakis and Skaltsa 2012: 641). And many continued to make their way into foreign hands where they were exchanged for considerable sums of money. Additional laws have been enacted in 1932, 1977 and 1998, and further initiatives are in progress (Marthari 2001).

Looting, illicit excavations and antiquities trafficking have a number of negative consequences: the context within which artefacts were deposited can no longer be established and vital information about past societies and practices is therefore lost. Due to looting being an illegal activity, the precise location of origin of the item is likely to have been lost or deliberately obscured. Stolen antiquities make their way by lorry to European centres of the antiques markets, such as Basel in Switzerland or Munich in Germany, where they are traded to museums and collectors and eventually surface – sanitised – in a sales catalogue (Marthari 2001). For much of the modern era, looting has been an integral part of the antiques' market; where there are buyers – be it museums or private collectors – there is a supply. It was only in 1970 that UNESCO passed the *Convention on the Means of Prohibiting and Preventing Illicit Import, Export and Transfer of Ownership of Cultural Property*. Still, illegal practices continue at an undiminished pace across the globe (Brodie et al. 2000; Brodie and Renfrew 2005). With regard to Greece, it is Macedonia, Thessaly, Boeotia, the Argolid, Corinthia, Messenia, Crete and the Cyclades which have been worst-affected by illegal excavations, with Mycenaean, Minoan and Cycladic cemeteries being by far the most attractive prehistoric targets (Marthari 2001).

An analysis of several collections by Chippendale and Gill (2000: Table 1, Table 3) illustrates the magnitude of the information lost: of 15 early Aegean objects in the White and Levy Collection, New York, only one has a precise origin. In all other instances the provenance is unstated, hypothetical or circumstantial at best. In total, 93% of the collection has no stated provenance. An even starker picture applies to the Fleischman Collection, New York, which shows no provenance for any of the prehistoric Greek objects. Overall, 92% of all objects in the collection are without provenance.

Those who believe that illegal trafficking in cultural property was the preserve of enthusiastic, but ultimately misguided, antiquarian collectors of the past, are sorely mistaken. Chippendale and Gill's analysis demonstrates that all of the early Aegean objects in the White and Levy Collection were purchased after the Second World War. In fact, 40% of the artefacts made their first appearance in the latest catalogue (2000: Table 2). Altogether, the authors estimate that 85% of all artefacts in the collection cannot be traced back earlier than 1945. The Fleischman Collection, too, suffers from the same issue: all prehistoric Greek objects surfaced after 1945 and 50% were reported for the first time in the latest catalogue (2000: Table 4). Taking into account all of the investigated private and museum collections, it is clear that the vast majority of finds (70–80%) have been added to these collections after the 1970 UNESCO convention watershed (2000: Table 6).

The best-known example of illicit trade in prehistoric artefacts are the iconic Cycladic marble figurines dated to the Early Bronze Age. These predominantly female marble figurines and figures have

come to light at many Cycladic islands, mostly from graves where they formed part of the grave good assemblage (Figure 1.11). Special deposits containing hundreds of fragmentary pieces have also been revealed on the island of Keros (see Chapter 5). Their acquisition by collectors and museums had become so desirable that Gill and Chippendale estimate that the thousands of looted graves add up to a loss of 85% of the entire Early Cycladic funerary record (1993: 625). Referenced by travellers in the 18th century and early 19th century, they were looted from graves and sold to travellers and scholars and eventually became an integral part of museum collections (e.g. British Museum, Fitzwilliam Museum, Ashmolean Museum) in the latter half of the 19th century and early 20th century (Gill and Chippendale 1993; Marthari 2001: 165; Galanakis 2013). However, until the mid-19th century, it was unknown who or what the figurines represented, their age and even where exactly they originated. Instead they were collected for their antiquity and unusual appearance (Fotiadis 2006). Out of touch with the artistic mood of the time, these figurines were initially considered ugly ‘primitive idols’. However, on display in several museums across Europe, they quickly became inspirations for emerging artists, such as Jacob Epstein, Constantin Brancusi and Henry Moore, who valued their simplicity of form and lack of distracting detail. As the modern movement grew, so did the appreciation of Cycladic figurines. Following the Second World War, the appeal of Cycladic objects also reached America and marble figurines became a desirable component of North American museums’ collections (Gill and Chippendale 1993: Table 6). In Greece, the Goulandris Collection stands out for providing a home for orphaned Cycladic artefacts and preventing their sale outside Greece. While designed to rescue objects without archaeological context, some scholars, however, have argued that its very existence and ability to offer a fair price for looted artefacts may have encouraged exactly those activities it was hoping to inhibit (Elia 1993: 67).

Above and beyond their aesthetic value, the monetary value that Cycladic figurines can fetch in auctions is equally attractive. The assignation of named Master sculptors by Getz-Preziosi (1987, 1994) no doubt adds to both kinds of value. The 1991 Sotherby’s sale catalogue lists a female marble figurine that resembles Dokathismata and Chalandriani varieties. Advertised for £130,000–£180,000, it sold for £143,000 (Chippendale and Gill 2000: appendix). A large female figure was sold for $275,000 in New York in 1992 (Gill and Chippendale 1993: 659). The 1990 estimate for a fragmentary male Cycladic figurine of the Spedos variety was even greater, reaching £250,000–£300,000 (Gill and Chippendale 1993: 607). As recently as 2010, a marble figure sold for more than $16 million (Renfrew 2017: 638).

Gill and Chippendale (1993: Table 1) have calculated that of the approximately 1600 known figurines, only 212 were found in legitimate archaeological excavations of graves and settlement sites. In addition are the finds from recent legitimate excavations at Keros and Dhaskalio-Kavos which add up to hundreds of additional fragments (Renfrew et al. 2007b; Renfrew et al. 2013). The remainder of the objects simply ‘surfaced’ on the arts market without a confirmed findspot or excavation reference. The sources for these ‘surfaced’ objects are re-emergence of forgotten figures, modern fakes or illicit excavations.

When the archaeologist Christos Doumas conducted excavations in the 1960s, looting was a common occurrence. He recalled: “They [the looters] were everywhere, and so I was running behind to rescue what I could. There must be hundreds of cemeteries from the last 1950s, early 1960s onwards and some of them, they have been totally ruined. We don’t know any existing cemetery that has not been touched” (cited by Gill and Chippendale 1993: 610). Based on testimonies from locals and relatives, Marthari was able to create a biography of the notorious forger Angelos Batsalis from Ios which demonstrates the

Figure 1.11 Cycladic figurine (Wikimedia Commons 2014).

close relationship between antiquities theft, fakes manufacturer and drug smuggling in the early 20th century (2001: 166). That these illegally obtained artefacts nevertheless made their way into museum and private collections (via intermediaries) is easily apparent from the lack of provenance information on most of the figurines: not a single Cycladic object in the 'Early Art in North American Collections' 1987 exhibition has a secure known origin and many items had first been acquired in the 1960s, 1970s

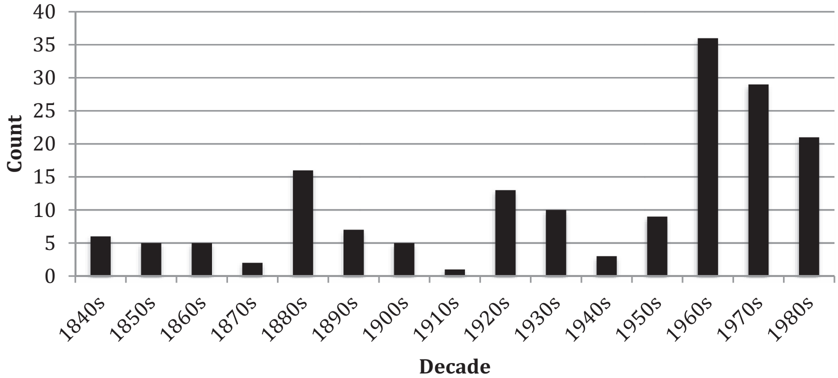


Figure 1.12 Period of acquisition of Cycladic figures by European and US museums and collections.

and 1980s – almost 50% after the 1970 watershed (Gill and Chippendale 1993: tables 2–4). The picture is slightly better for the Karlsruhe 'Art and Culture of the Cyclades' exhibition in 1976 which drew mainly on European collections. Here, over one-fifth of objects have a secure provenance (Gill and Chippendale 1993: Table 5). The recent popularity of the figurines is particularly prominent when one compares their history with other museum acquisitions. Fifty percent of the objects displayed in the 1994 *Greek Gold* exhibition that brought together objects from the British Museum, Metropolitan Museum of Art and the Hermitage had been acquired by 1870. For Cycladic figurines the equivalent year is 1960 (Chippendale and Gill 2000: 502; Gill and Chippendale 1993: Table 6) (Figure 1.12).

Where supply does not meet demand, forgers often fill the gap. From the 1960s onwards, scholars have voiced doubt over the authenticity of some Cycladic figurines – especially those that stand out due to their size or rare type. Unfortunately, there is no scientific test that can verify the age of manufacture of a stone object and archaeologists have to rely on proxy indicators, such as stylistic features, stone composition, or surface encrustation, all of which are unreliable and/or open to manipulation (Gill and Chippendale 1993: 616–617). Forgeries were probably manufactured in Parisian ateliers, but also in Greece itself. While the lack of a secure provenance does not necessarily prove that the figurine is a fake, it makes it all the more likely. Particularly doubtful are the large figures. "Not one of those comes from a secure archaeological context, and it is disconcerting that this class of figures waited until the market boomed before surfacing" (Gill and Chippendale 1993: 619, Table 8). However, recent excavations on Keros have revealed fragments of a large figure (estimated to have been 1m in height originally) from a secure context for the first time (Renfrew 2013). Given the lack of a secure provenance, it is entirely possible that some of the sculptors identified by Getz-Preziosi as master sculptors are forgeries. Taking a lack of provenance as their guide, Gill and Chippendale estimate that the corpus of as many as six (out of 16) Master sculptors (e.g. Ashmolean Museum Master, Copenhagen Master, Steiner Master) may be a modern creation (1993: 637). However, not all unprovenanced figurines necessarily represent forgeries. With the systematic production of forgeries starting in the 1920s, Renfrew argues that all figurines documented up to 1914 should be recognised as genuine and many recent acquisitions may also be genuine (Renfrew 2017).

It is clear from the above that the history of collecting Cycladic marble figurines, and, one may argue, Cycladic art more generally, is based on the objects' great artistic and visual appeal. Having captured the *zeitgeist* of early 20th century artists, their rise was exponential, turning them into an essential display object for national museum collections. This passion has come at a price with uncertainty about their origin and ancestry continuing until today. In parallel with Classical Greek marble statues, however, the supposedly pure white marble surfaces of Cycladic figurines had hair, facial features and body tattoos painted on them. Intriguingly, therefore, our fascination with these figurines is based on a profound misunderstanding of their appearance and, most likely, function.

2

THE AEGEAN ISLANDS IN SPACE

To set the scene for the remainder of the book, this chapter investigates key parameters, such as geology, sea level, climate, land, water, diet, health and seafaring technology.

GEOLOGY

The geology of the Aegean islands is extremely complex (Figure 2.1). Higgins and Higgins (1996) divided Greece into 14 geological zones, though there is further diversity within each of the regions. The Cyclades, part of the Attic-Cycladic metamorphic belt, are extremely varied in their geological composition. Melos and Thera are characterised by lava from different volcanic eruptions; Siphnos, Paros, Naxos, and Ios are made of marble, schist, gneiss and amphibolite; schist, gneiss and amphibolite dominate on Andros, Kea, Kythnos, Syros and Tinos, granite on Mykonos and limestone and flysch on Amorgos. Several of the Dodecanese islands (Kalymnos and Tilos) are made up of limestone. Limestone also is a component on Rhodes, although neogene sediments and flysch are also common. Kos is composed of tuff, schist and flysch. Nisyros, an active volcano, has diverse volcanic rocks and lava streams that indicate its long-standing volcanic activity. The Northern Sporades are composed of schist and marble while their eastern neighbours are more diverse with each island made up of its distinct geology. Lesbos, and to a lesser extent also Chios, are composed of volcanic rock with limestone, marl, schist and marble as additional components. Marble and schist also characterise Samos. The Northern Aegean Islands have distinct geological profiles with schist, gneiss and marble typical for Thasos, metamorphosed gabbro, slate and granite representative of Samothrace and limestone, marl and volcanic rock common on Lemnos.

Plate tectonics have impacted most profoundly on the formation of Greece and the islands. The Eastern Mediterranean is dominated by the collision of the Eurasia, Africa and Arabia plates which in turn influence the Anatolian and Aegean microplates (Figure 2.2). The African plate is moving

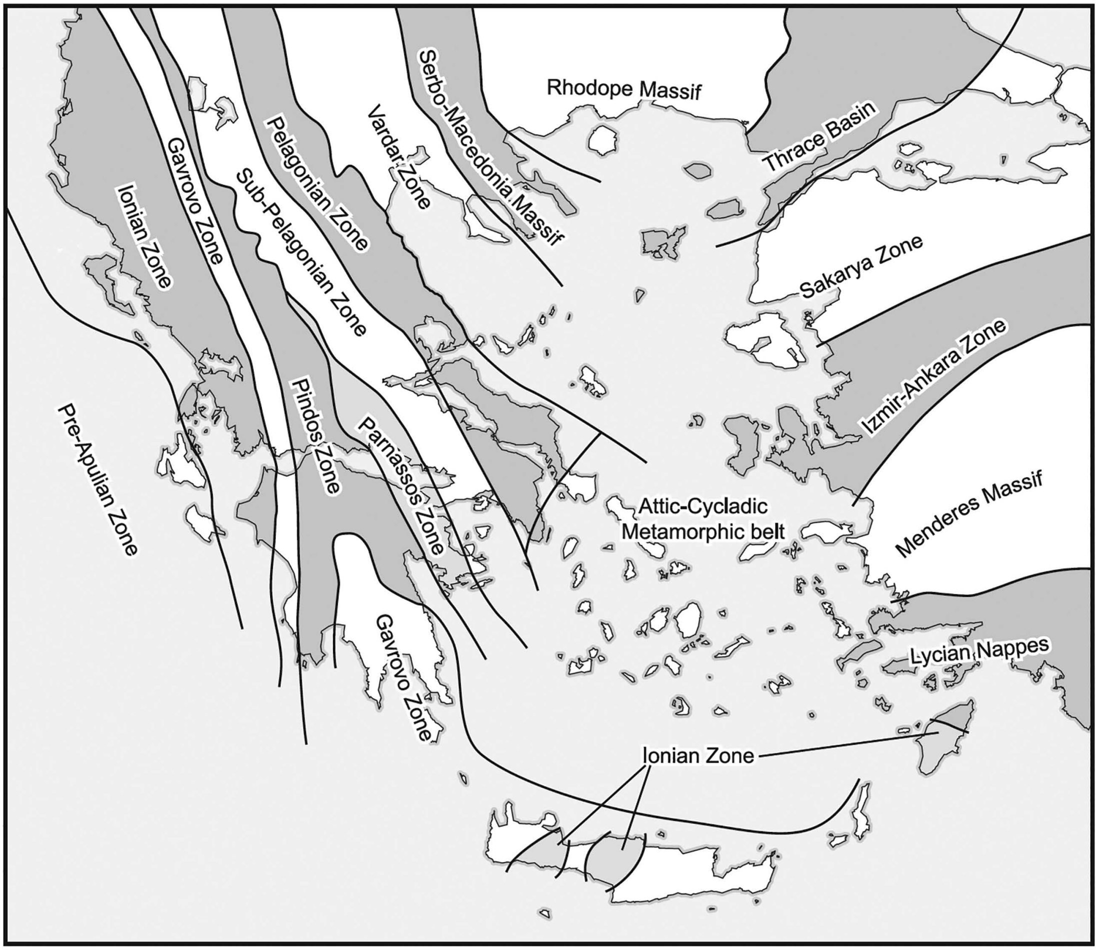


Figure 2.1 Geological zones of Greece (after Higgins and Higgins 1996: Fig. 2.2).

northeastwards while descending underneath the Aegean plate. In the Miocene the crust above the subduction zone arched upwards and formed the islands of Kythera, Crete, Karpathos and Rhodes and southeastern Turkey, creating the outer (southern) non-volcanic Hellenic Arc. The inner (northern) arc, the South Aegean Volcanic Arc, is characterised by five volcanic centres which run from Aegina in the West, Melos and Thera in the centre to Nisyros and Kos in the East, and came into existence as subducted slabs as the earth's mantle melted. Indicating tectonic zones of weakness, the Hellenic Arc region has the highest volcanic and seismic activity within Europe (Bohnhoff et al. 2006: Fig. 2). Volcanism continues on Thera and Nisyros until today. In fact, Thera has erupted at least seven times between 1573 and 1950 (Dimitriadis et al. 2005). Another weak zone, the so-called North Anatolian Fault zone, exists between the Anatolian plate that is moving westwards and the stationary Aegean plate. This plate movement is marked by the existence of the North Aegean Trough, a fault line with high seismic activity (Higgins and Higgins 1996).

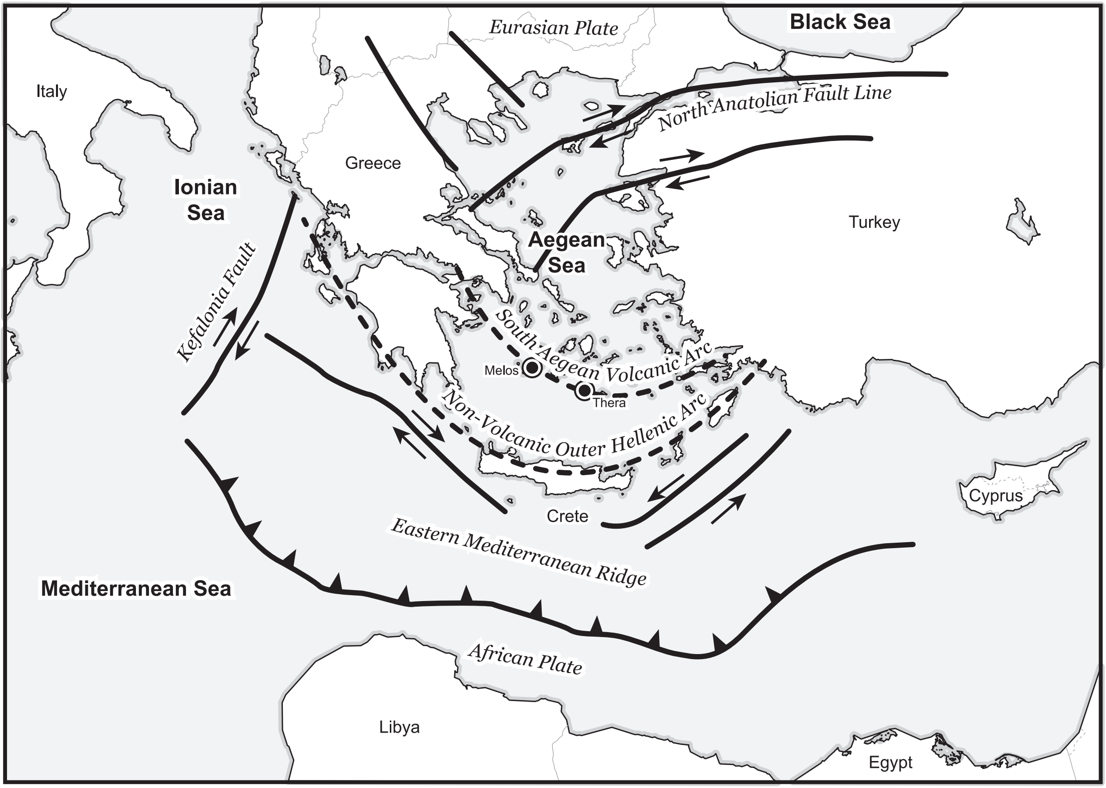


Figure 2.2 Geotectonic map of Aegean Sea (after Pararas-Carayannis 2011: Fig. 2).

SEA LEVEL CHANGES

Since the glacial maximum around 18,000 BP, the global sea level has risen by ca. 120 m (Figure 2.3) (Fairbanks 1989; van Andel 1989). This sea level change had a major impact on the Mediterranean by eliminating extensive coastal plains and increasing travel distances between islands (e.g. Jameson, Runnels and van Andel 1994: 202; Lambeck 1996; van Andel et al. 1980: 399). Greece, located where the African and Eurasian plates converge, additionally experiences much local and regional tectonic movement, so sea levels across Greece can vary greatly between different regions. For example, an analysis of past sea level data from 175 independent locations across the Aegean has demonstrated considerable regional variability over the last 2,000 years and suggests that generalisations cannot be drawn for locations more than 50 km apart (and possibly as little as 20 km) (Flemming 1978; cf. Rapp and Kraft 1978). There is no predictable pattern of directionality of movement as both relative uplift and submergence is visible at sites.

There was a rapid loss of extensive shorelines when sea levels rose from −120 m at the time of the glacial maximum (ca. 18,000 BP) to −7 m around 5,000 BP; sea levels eventually stabilised by the Middle to Late Bronze Age. The available evidence suggests that subsequent fluctuations, if they took place, were limited to two metres above and below present sea level (Figure 2.3 inset). While two metres of

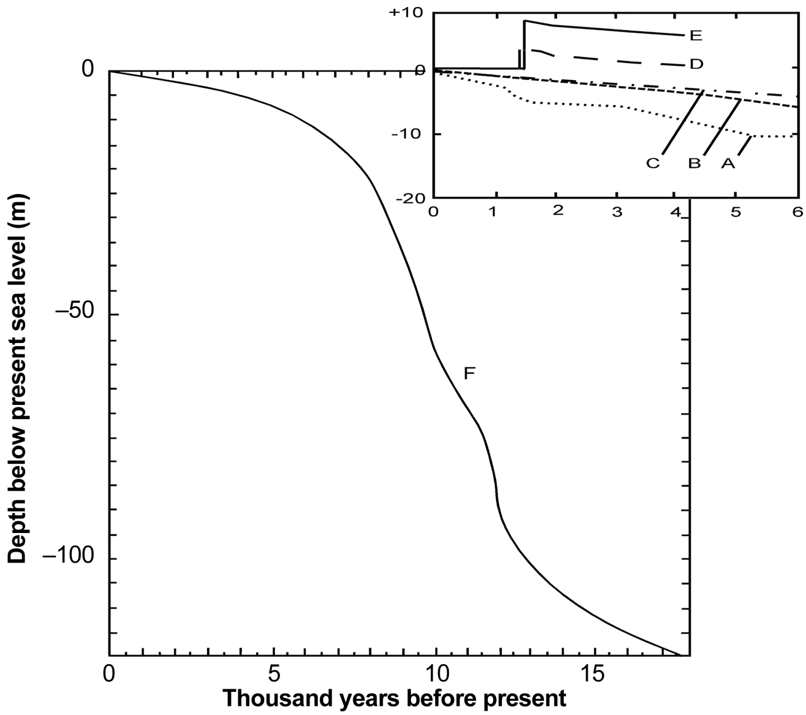


Figure 2.3 Sea level rise since the last glacial maximum.

sea level rise may have caused some communities to relocate, the mountainous profile of most islands would have ensured that the available land area remained relatively constant and that distances between islands did not change greatly throughout the Bronze Age.

CLIMATE

Hot, dry summers and mild, wet winters characterise the modern Greek climate. Rainfall occurs predominantly in the winter months, while strong northerly winds, the Greek *meltemia*, typically occur during the summer months. To determine the nature of the climate in prehistoric times, scholars draw on proxy palaeoenvironmental indicators. These include pollen, diatoms, foraminifera and stable isotopes gathered from a variety of natural contexts, such as tree rings, sediment cores and mineral deposits from caves. Each of these indicators has their own challenges and opportunities that determine the precision and scope of the information that can be gleaned. However, the greatest problem by far is precise dating of the layers or contexts in which palaeoenvironmental evidence occurs to allow us to link observed climatic changes to specific time periods and understand the speed of change. Dating techniques vary according to the material and context studied, but may include radiocarbon dating, uranium-series

dating, tephrochronology, dendrochronology and varve chronology. By far the most commonly used technique is radiocarbon dating which can provide relatively narrow date ranges for samples up to about 50,000 years old (Taylor and Bar-Yosef 2014).

During the last Ice Age, a cool and dry climate created a steppe vegetation ideal for browsing herbivores. With the beginning of the Holocene, the most recent warm Interglacial, the cool and dry conditions prevailing since the late Ice Age were replaced by wetter and warmer weather (Figure 2.4). A trend towards dryer conditions became established in the mid-Holocene (ca. 4,000 BC) but this general picture disguises a multitude of short-term trends and high regional variability which make this time period rather complex climatically speaking.

In a comprehensive meta-analysis of published palaeoenvironmental studies of the Eastern Mediterranean region, Finné and colleagues brought together 80 studies that scored highest on dating reliability, time resolution, use of reliable climate proxy indicators and long time span (2011). This meta-analysis is of great interest to us as it incorporates studies from Greece and the Aegean islands covering the

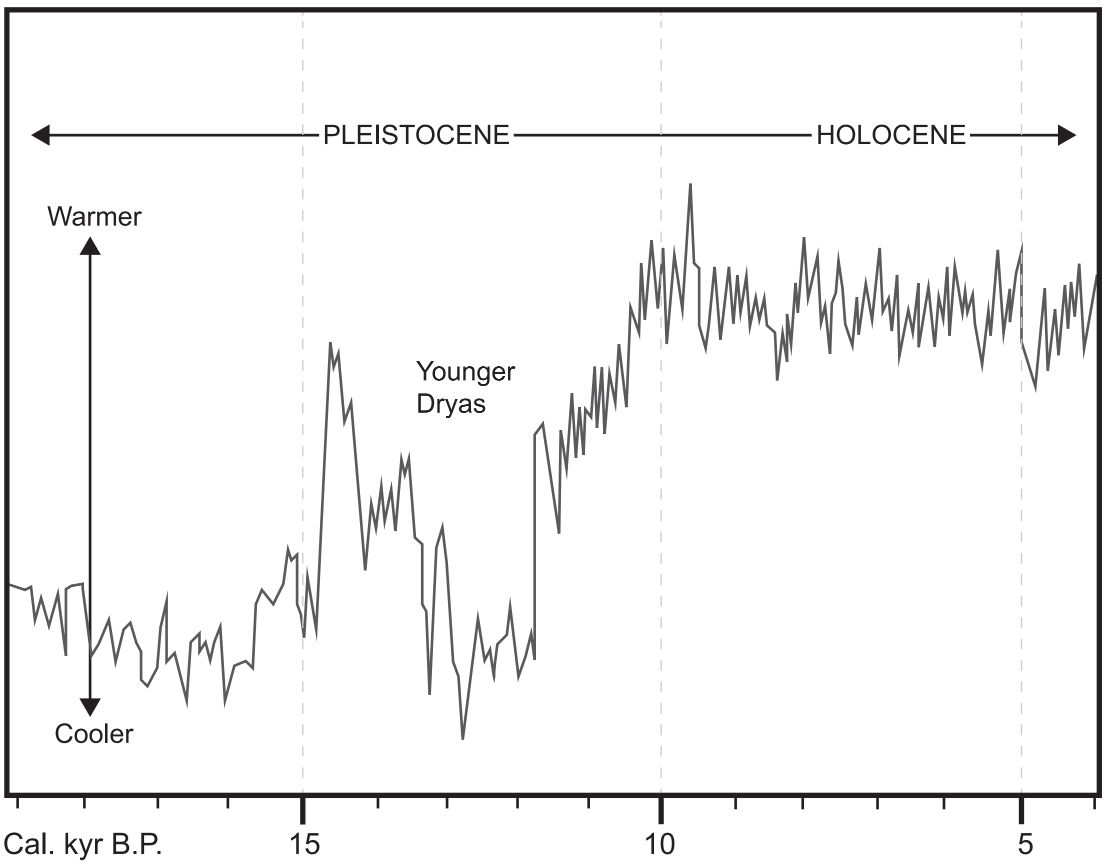


Figure 2.4 Climate change in the North Atlantic region (after van Andel 2005: Fig. 1).

Neolithic through to Late Bronze Age. Their findings showed that the Eastern Mediterranean experienced a shift from a wetter early Holocene climate to drier conditions between ca. 4,000 BC and the Roman period, though there was also strong evidence of regional variability. This change was gradual in nature, and plants adapted quickly to the new climatic regime. A spell of more humid climate around 3,000 BC interrupted the general trend towards a drier climate only briefly.

As regards Greece, most of the climate proxies are unfortunately pollen cores whose composition may be heavily impacted by human activities and which are therefore considered less accurate for climate reconstructions. Nevertheless, a general picture of a trend towards drier conditions from ca. 4,000 BC is apparent in Greece also as cores show a decline in pollen from more temperate Central European tree species that favour relatively humid environments, such as lime, alder, and oak. Brief intervals with cooler or warmer weather punctuate this long-term trend and often are confined to specific regions within the Aegean. The overall picture is one of great variability within the overall trend (Finné et al. 2011). However, how much of these changes reflect change in how humans utilised the landscape remains a matter of debate. The use of other, more unambiguous climate proxy indicators becomes therefore essential from the Neolithic period onwards when people are first thought to have made significant and lasting impacts on the natural environment through, for example, deforestation, drainage or water dams.

The so-called 4.2k event has been debated by scholars at length. It signifies a proposed rapid climate anomaly, a pronounced dry period, that occurred ca. 4,200 BP (or ca. 2,200 BC) across the Eastern Mediterranean and coincides with the collapse of the Akkadian empire (Weiss et al. 1993; Weiss 2012; see also contributions in the Holocene 2011 issue 1). Although Greek records indicate cooler, drier conditions around 2,200 BC, there is no indication of a rapid or sudden 'event'. It is likely that, whatever effects the dry period had in the Near East and Levant, its impact was less pronounced in Greece. Overall, when comparing climate proxies, Finné and colleagues emphasise the relatively low variability across the lengthy time span; the average temperature fluctuation in the eastern Mediterranean over 6,000 years is 4.5°C (Finné et al. 2011).

What would the impact have been on humans and animals of a slow, gradual development from cool and moist to warm and arid Mediterranean conditions? On one hand, a slightly moister climate – comparable perhaps to that of modern Epirus – would have resulted in higher annual rainfall providing more soil moisture for vegetation and increasing the storable water supply. The vegetation cover, including woodland, would have been more extensive and more diverse. Yields from dry farming are likely to have been greater and the food supply for humans moderately more reliable. On the other hand, a drier climate would have, at times, made dry farming difficult and increased the need for irrigation and diversity in the crops planted. Water storage would have been of even greater importance. The use of water-demanding cattle would have been reduced in favour of goats and sheep.

THE LAND: SOIL, WATER AND EROSION

Soil is crucial to agriculture and animal husbandry. Soils of the Aegean islands are generally considered to be poor because limited vegetation prevents the formation of humus which contains essential

nutrients and the hot sun leads to water evaporation, drawing out further nutrients (Bintliff 1977: 90). However, such views were not based on soil analyses but on comparisons with present-day conditions which assumed constancy of climate over the last 4,000 years – an assumption now questioned. The island of Thera, thanks to the volcanic eruption in the 17th century BC, has become a case study in the analysis of palaeosoils. The first analyses of pre-eruption soils undertaken by Davidson indicated that no soil or only thin rubble-derived soil was present on hillsides and only poorly developed soil on level ground. These soils, due to low moisture content, organic matter and nutrients, were not particularly fertile but would have allowed plough agriculture (1978, 1980; Limbrey 1990). More recent soil studies provided additional details such as the existence of different types of soil, including “thick brown loamy soils, thin stony soils, barren, relatively unweathered volcanic ashes and lavas, and metamorphic basement rock” (Aston and Hardy 1990: 355). These soil types are familiar from modern Thera but may have been more developed in the Bronze Age as they had more time to build up since the last eruption (Rackham 1990: 389). Palaeobotanical remains support this conclusion as there is ample evidence of cultivation/exploitation of cereals, pulses and fruits as well as trees (olive, tamarisk, oak) (Grove and Rackham 2001: 320–321). It thus appears that the Aegean islands had soils of sufficient quality for the cultivation of relatively resistant and undemanding crops, such as barley, pulses and olives. Under these circumstances, inter-planting of cereals and pulses must have been practiced in order to replenish the soil’s nitrogen content. The presence of bones from sheep/goat, pig, cattle and wild mammals points to adequate pasture for these animals, and the existence of (limited) woodland is attested by charcoal samples and animal species with a preference for these habitats.

Nowadays the Aegean islands are, for the most part, arid environments which lack permanent rivers, although most islands have seasonal streams. Supplies of ground water vary from abundant (Naxos, Kea) to limited (Melos) and need to be supplemented with collected rain water. It is likely that such variation in water supply also existed in the past.

If modern topography and rainfall patterns are appropriate parallels for past diversity, we can assume that the mean annual rainfall varied substantially according to the topography of the land. The average annual rainfall for present-day Melos is 450 mm and for Thera about 350–450 mm (Figure 2.5); estimates for Bronze Age Thera indicate annual precipitation of ca. 600 mm (Asouti 2003). Variability between islands and regions went hand in hand with inter-annual fluctuations which could vary by as much as 50%. The wet season in modern Crete runs normally from late September to late April, but can be as short as November to December or as long as late August to beginning of July (Grove and Rackham 2001: 27).

While moderate rainfall is desirable for humans, animals and crops, heavy rain or deluges, on the other hand, can destroy a year’s harvest or even a lifetime’s investment in olive trees or grape vines within only a couple of days. Deluges, defined as rainfall of more than 100 mm in one single event, are a commonly occurring phenomenon. Evidence from present-day Crete shows that deluges primarily occur in the wet season between September and April with a peak in January, the month with the highest rainfall (Grove and Rackham 2001: 35). Some major deluges that have been recorded for 20th-century Crete were caused by heavy rains that discharged up to half of the annual rainfall within a few days (Grove and Rackham 2001: 34; Hogarth 1910: 83).

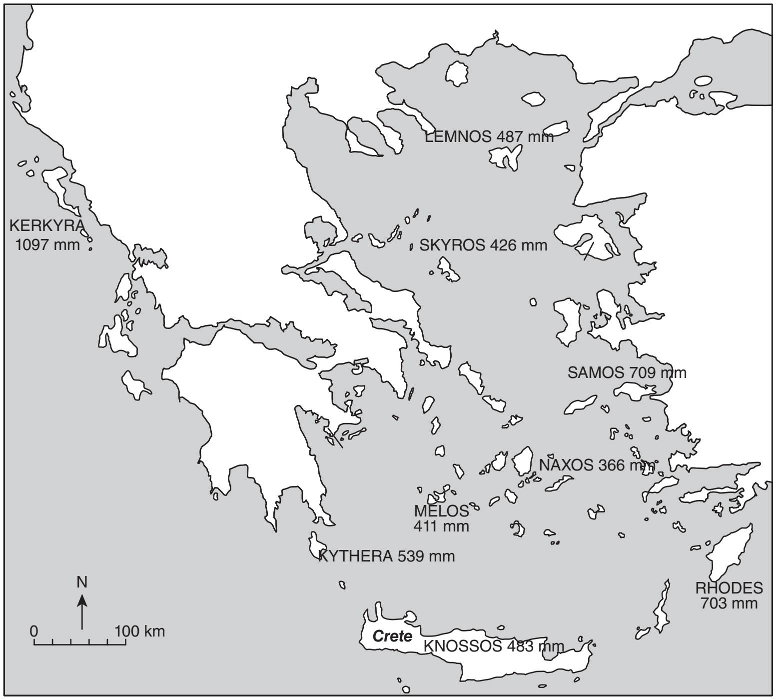


Figure 2.5 Average annual precipitation on Greek islands (after www.currentresults.com/Weather/Greece/average-yearly-precipitation.php).

A limited water supply and great inter-annual variability in rainfall made periodic droughts a regular occurrence in the island, and several dry years may occur in succession. To mediate the consequences of differential water supply, the islanders had to put a range of strategies into place (Sarpaki 1992; Wagstaff and Gamble 1982). These probably included the collection of rain water, a preference for keeping goats or sheep over water-demanding cattle, the practice of dry farming for cereals and pulses, diversification of food crops into those with different water needs and planting of relatively drought-resistant vines and olives. The success of these local strategies, combined with intensive and wide-ranging trade networks, is visible in the longevity of settlement in the Aegean islands.

Over the last 25 years, the study of erosion events has rightly become an important part of archaeological investigations generally as erosion can have a potentially devastating impact on already fragile soils and limited water supplies. Zangger, van Andel and their collaborators in particular have documented many erosion episodes in Greece from the Neolithic onwards and have identified human activity as the prime cause (van Andel, Runnels and Pope 1986; van Andel and Zangger 1990; van Andel, Zangger and Demitrack 1990; Zangger 1992). While the hypothesis that intensified human activity led to erosion episodes has many followers (e.g. Jameson, Runnels and van Andel 1994; Watrous et al. 1993), other scholars have voiced doubts arguing either that climate change or extreme weather was

a more likely cause (Grove and Rackham 2001; Willis 1994) or that natural and anthropogenic landscape changes cannot be distinguished easily due to the coarse resolution of palaeoecological evidence (Barker 1996; Halstead 2000).

Let us be clear: erosion is a constantly occurring process that can have both beneficial and negative consequences on the landscape. Without erosion there would have been no sediment deposition for cultivable land which the Neolithic and Bronze Age settlers rated so highly, and no fertile alluvial fans or river deltas. More importantly perhaps, most of this accumulated eroded material, Grove and Rackham (2001) believe, did not actually come from cultivatable topsoil, but from gullies and sidecuttings, and would thus have had no detrimental effect on existing agriculture.

This is not to deny that certain events or practices can accelerate erosion and thus lead to land degradation. However, tree-felling, expansion of agriculture into marginal land or expansion of animal pasture, as argued by Zangger, van Andel and their colleagues, have not been shown to be among these factors (Grove and Rackham 2001: 241–270). Instead, the (deep) plough and modern bulldozer, tectonics and geology have emerged as the most important factors in determining the intensity of erosion. Rainwater is the second-most important factor. However, moderate rainfall is not a major erosion hazard (less than 10 mm of rain at a time has virtually no effect) and even larger downpours of up to approximately 20% of annual rainfall in one episode may not be that detrimental as landscapes can adjust to specific volumes of rain without increased erosion. Deluges with a high intensity burst of rain (more than 30–40 mm per hour) and which cannot be absorbed by the vegetation cause the greatest damage. Vegetation can enhance or hinder erosion, but underlying geology has been shown to play an even greater role than type of vegetation cover (Grove and Rackham 2001).

Drawing on modern experiments and ancient soil studies, Grove and Rackham therefore argue that the Mediterranean landscape was generally more resistant and adaptable than it has often been given credit for (2001). Evidence from Thera suggests that soils would have been relatively thin but sufficient for plough agriculture. Where woodland did not cover the land, shrubs, maquis and grassland adequately protected the land from erosion. The common practice of inter-planting and mixed planting of crops would have reduced soil erosion on cultivated plots.

Coastal erosion must also have been a major issue, especially given the proximity of many settlements to the sea. Research into this topic is still in the early stages, but the gradual erosion of the settlement at Phylakopi on Melos that we can witness today is a visible reminder of its impact also on ancient societies.

THE SEA: BOATS, TIDES, CURRENTS AND WINDS

In order to access islands, people had to utilise boats. Regardless of whether it was a short reconnaissance trip, a visit to extract desired raw materials, a long-term colonisation or a trading venture – any movement to, from and between islands required a boat or raft. Rock carvings of boats illustrate the different types of boats that islanders utilised – most likely taking account of the kind of cargo to

be transported and the distance to be traversed (Televantou 2008a). With artefactual evidence of Greek seafaring technology limited, much of our knowledge is derived from pictorial evidence, experimental work and ethnographic parallels (see also discussions in Chapters 3, 4 and 5).

Prior to the emergence of the sail, people used floats, rafts and rowing boats; none have survived as actual artefacts, but were most likely made of reed, wood or hide. These crafts were influenced in their manoeuvrability by sea-surface currents and winds. As a consequence, travellers may have had to wait for calm conditions before embarking upon their journey (e.g. Tzalas 1989). The advantage of not being reliant on wind direction, however, meant that a rowing boat could comfortably travel in any direction during calm weather. Experiments have indicated that speeds of 3–4 knots can be achieved in calm sea. However, calm conditions are not a necessary prerequisite. Experiments have shown that rowing against head-wind and counter-current is achievable – even if exhausting (Mantzourani and Theodorou 1991: 42 check; Severin 1985). Broodbank (2000a) estimated that the fast Early Bronze Age paddled longboats manned by a crew of about 19 rowers could travel up to 50 km in a single day. While such distances were unachievable for heavily laden cargo ships, it nevertheless indicates the relative ease with which different regions were able to interact. From the end of the EBA onwards, however, deep-hulled sailing ships characterised by a greater cargo capacity came into widespread use and have been depicted on Minoan seals and sealings (Figure 2.6), on two sherds from Phylakopi, as well as on Theran wall paintings (Casson 1971; Morgan 1988; Wachsmann 1998). In addition to being able to carry greater loads and travel speedily under the right wind, sailing boats also had the benefit of requiring a smaller crew. Influence from tides and currents was minimal, but their dependence on wind meant that they were best suited to travel in moderate wind conditions (3–5 Beaufort). Initially scholars believed that the square-rigged sail did not permit tacking and hence boats could only travel in the direction of the prevailing wind (Morgan 1988; Wachsmann 1998, 2000); subsequent experimental work has shown, however, that square-rigged sails could reduce their sail area, thus permitting sailing at a close angle to the wind and tacking manoeuvres (Georgiou 1991, 1993; Roberts 1991; Severin 1987).

Tides, currents and winds undoubtedly impacted on sea travel in the Aegean, but neither the boat's route nor destination was predetermined by these environmental forces. This is because the Mediterranean is essentially tideless. Even spring tides only vary between 0.1 and 0.8 m – as a result, tides are considered to have little or no impact on seafaring (Mediterranean Pilot 2000; Heikell 2001). Likewise, currents are considered to have little impact on boats as the vast majority of them do not exceed speeds of half a knot. Only where the sea is pushed through narrow gaps, such as the Elafonissos Strait between Kythera and Cape Malea at the tip of the Peloponnese or the Kaphireas Strait between Andros and Euboia, do currents gain considerable speed and power and impede movement by boat. Instead, it is the wind that is considered to be the most influential factor in Greek seafaring – be it by raft, rowing boat or sailing ship. Strong winds can decrease, increase, halt or even reverse currents (Mediterranean Pilot 2000). It is commonly assumed that predominant winds vary in strength according to season (light winds in the summer and strong winds in the winter), resulting in a sailing season that extends from April to October. While it is true that there are more gales and storms in the winter months, it is also clear that there is an *overall* predominance of comparatively calm conditions throughout the year – between 50%

Figure 2.6 Boat depictions: a) stone engraving from Naxos (after Doumas 1967: Fig. 50), b) Minoan seal, c) Naxian lead boat model. Source: Images b) and c) courtesy of the Trustees of the Ashmolean Museum.

and 75% of all winds could be classified as Beaufort 1–5 and were thus excellent for sailing or rowing in summer or winter. Another common assumption has been that predominant winds in the Aegean are southerly in winter and northerly, the Greek *meltemi*, in the summer – with obvious consequences for the direction and speed of travel (Agouridis 1997: 3–6; Morgan 1988: 162; Shaw 1990: 423). While it is correct that the *predominant* winds are northerly and southerly, modern wind data also show that West and East winds occur regularly throughout the year and that travel towards the South and North is possible at any time of the year if sailors are willing to wait for suitable winds (Figure 2.7). As Georgiou

Months		J	F	M	A	M	J	J	A	S	O	N	D	Mean
Av. cloud cover (oktas)		5	5	4	3	3	1	<1	<1	1	3	4	5	3
Wind distr. in % (8am)														
	N	44	42	44	34	43	54	78	74	62	58	38	40	51
	NE	5	6	5	5	6	7	9	10	7	8	7	6	7
	E	2	2	1	1	0	0	0	0	0	R	2	1	1
	SE	13	13	13	6	2	R	R	1	1	4	8	16	15
	S	14	11	14	17	14	12	3	4	7	6	17	14	11
	SW	7	8	4	4	2	4	R	0	1	1	3	5	3
	W	1	2	2	2	2	1	1	R	R	R	1	2	1
	NW	2	3	2	3	3	3	1	2	1	2	R	2	2
	Calm	12	13	16	29	28	19	9	11	17	18	15	15	17
Wind distr. in % (2pm)														
	N	52	52	58	51	61	69	86	84	74	70	51	50	60
	NE	4	4	4	4	5	6	8	9	7	7	6	6	6
	E	0	0	R	R	R	0	0	0	0	0	R	R	R
	SE	2	2	3	3	1	1	R	R	R	1	3	3	1
	S	20	21	17	19	15	9	2	3	10	12	24	23	15
	SW	13	11	10	11	7	7	1	1	5	3	8	8	7
	W	2	2	2	2	1	1	0	R	0	R	2	1	1
	NW	3	4	4	6	5	4	2	1	4	4	3	3	4
	Calm	3	3	2	5	5	3	1	1	1	3	4	5	3
Mean wind speed (knots) (8am)		15	15	14	9	9	9	14	13	13	13	12	14	12
Mean wind speed (knots) (2pm)		16	17	16	13	12	12	17	16	15	15	15	16	15
Days with gale		5	6	4	1	1	1	1	1	1	2	3	5	-

Figure 2.7 Wind data from Naxos weather station. Data compiled over 17 years. Conversion of the Beaufort scale into knots: 0 = 0–1 knot ("calm"); 1 = 1–3 knots ("light air"); 2 = 4–6 knots ("light breeze"); 3 = 7–10 knots ("gentle breeze"); 4 = 11–16 knots ("moderate breeze"); 5 = 17–21 knots ("fresh breeze"). Source: www.sailingissues.com/climate.html

has argued, "*all* winds can be expected at *all* seasons in the Aegean" (1993: 361 emphasis in original; cf. Heikell 2001; Mediterranean Pilot 2000). If experimental archaeology (Severin 1985, 1987) and ancient literary sources (Homer *Odyssey* XIX 199–202) are to be believed, then sailors would rarely have to wait longer than two weeks for a change in wind direction. An alternative option would be to travel during the night when predominant winds have abated (Mediterranean Pilot 2000: no. 1.3; Heikell 2001). With visibility actually much better in the Aegean during the winter months – avoiding the summer haze and sea mist which may reduce visibility to 3 miles or less – winter-sailing is likely to have been common also in prehistory (Heikell 1988: 76–77; Mediterranean Pilot 2000: no. 1.141–2; Georgiou 1993: 362).

It is likely that the majority of movement was on a local scale and involved coastal travel with stopovers. The length of individual islands is often greater than the distance to their closest neighbour. This suggests that sea links between communities from neighbouring islands may have been as common and important as links between communities on the same island. Essentially, the factors discussed previously highlight the relative ease and flexibility with which prehistoric sea travel of any distance could be undertaken (cf. Morton 2001). This is not to deny the risks inherent in sea travel as clearly demonstrated by numerous shipwrecks. However, isolation was not an option available to island communities as, leaving aside equally important social aspects of inter-island interactions, such as trade, gatherings and marriage connections (Renfrew 1993), the unpredictable climate and food supplies enforced mobility and contact in order to ensure survival.

The Aegean Sea is comparatively easy to sail and navigate and has rightly been termed a "seafaring nursery" (Broodbank 2000a: 25). In contrast to the Atlantic or even the North Sea, it offers virtually no tides, moderate winds and frequently clear skies (Heikell 1988; Mediterranean Pilot 2000; Morton 2001). The longest open-sea journey in the Aegean Sea is the approximate 93 km between Thera and Crete, but most of the region can be traversed by sight alone (Figure 2.8) and we have to assume that ancient navigators had learned to recognise distinct landmarks that served as navigational aids. During night time or when visibility was low, sailors could steer according to star or sun paths; alternatively, they could make use of current sets, water temperature and winds to stay on course. At other times, flight patterns of land birds may have guided them to land (Agouridis 1997; McGrail 1987, 1991a, 1991b; Morton 2001; Wachsmann 1998: 300).

DIET

The Mediterranean has an inherently unstable natural environment. For example, Whitelaw's summary of 16 British Consular Reports for the island of Kea illustrates that between 1897 and 1914

> crops were severely affected by drought in three years, by floods in one, and by a severe winter in another; four harvests of barley, wine and *velanidi* were individually poor, but all three crops were bad in the same year only once.
>
> (1991: 451)

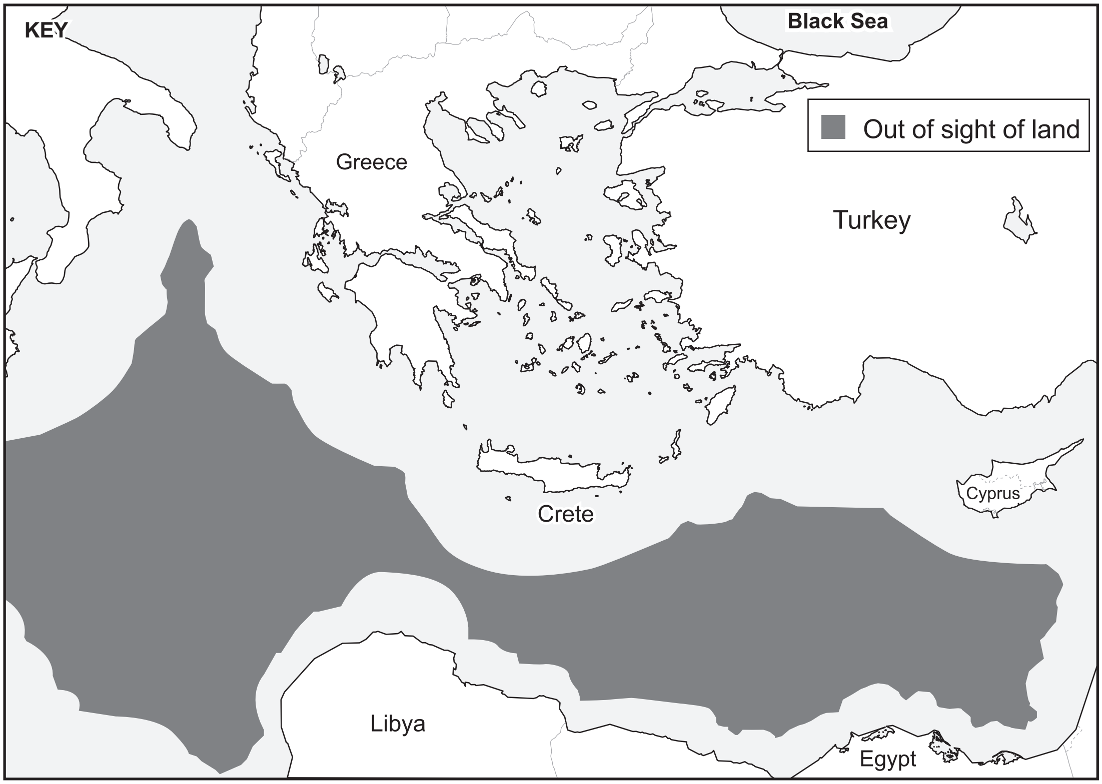


Figure 2.8 Seaward visibility in the Aegean (after Broodbank 2000a: Fig. 4).

Therefore, Mediterranean farmers base their survival on a combination of different strategies which exploit all environments and where products can easily be switched from one method to another. The strategies are diversification, storage, redistribution and mobility (Halstead 1981). Diversification is likely to include deliberately cultivating a wide range of crops, using different types of domesticated animals and exploiting or managing a great variety of wild resources, including mammals, bees, migrating birds, products from the sea, herbs and edible plants. Stockpiling food on a seasonal basis, as well as for times of dearth, is essential in Mediterranean communities (Halstead 1989) including particular ways of keeping domestic animals and storing cereals and dry legumes. How much of a surplus was common is unknown, but one year of supplies, for example, is envisaged in the Bible (*Exodus* 23: 10; 1 *Maccabees* 6: 49). Food preservation can be essential to survival such as making perishable items like fish, meat and fruits durable through salting, drying, curing, and pickling techniques (Horden and Purcell 2000: 181). Olives and grapes can be stored for longer periods when converted into olive oil and wine. Another method of survival is redistribution. This is particularly relevant in the Mediterranean where frequently varying microclimates may result in neighbouring

regions receiving very different quantities of rain. In such circumstances, stored foodstuff, livestock and non-food valuables can become exchange goods in times of need (Halstead 1981). Mobility is more difficult to achieve once a community has decided to settle and is more relevant to hunter-gatherer groups. However, seasonal movements, such as moving sheep and goats to summer grazing in the mountains, was probably common.

Bronze Age people consumed a wide range of food types ranging from cereals, pulses, nuts and fruits, to sheep, goat, pig and cattle. Until quite recently, scholars regarded cereals as the major ingredient in the Aegean Bronze Age diet (Renfrew 1972) based on the argument that cereals are superior to other foods for being high in calories, comparatively undemanding of labour investment (Gallant 1991: 63–64, 75–76), easily grown, high yielding, easily stored over long periods and easily transported. More recent research has revised this view by acknowledging the important nutritional role pulses played in the ancient diet. For example, pulses probably constituted more than 50% of the ancient diet at Akrotiri (Halstead and Jones 1989; Jones 1987; Sarpaki 1992) (Figure 2.9). Compared to cereals, pulses have the advantage of contributing high levels of proteins to the human diet and they are more tolerant of low rainfall, and drier and less fertile soils (Figure 2.10). Because of these advantages, pulses can help buffer

Site	**CEREALS**					**FRUITS**					
	Barley	***Emmer***	***Einkorn***	**Bread wheat**	**Wheat**	**Olive**	**Grape**	**Fig**	**Pomegranate**	**Almond**	**Date-palm**
Akrotiri, Thera	*	*	*			*	*	*	*	*	*?
Phylakopi, Melos	*				*		*				
Ay. Triadha villa					*						
Ay. Triadha house					*						
Gournia town											
Kastelli Chania	*	*	*			*	*				
Knossos palace	*?				*						
Knossos, Unexpl. Mansion	*	*		*				*			
Knossos, Caravanserai	*						*				
Mallia palace, E. magazines					*						
Palaikastro town, Room 23					*						
Phaistos	*					*	*				
Zakros						*	*				

Figure 2.9 Archaeobotanical evidence for cereals, legumes and fruits in the Bronze Age Cyclades and Crete (based on Riley 1999: Table 3; Halstead 1992: Table 1; Sarpaki 1992b: Table 3).

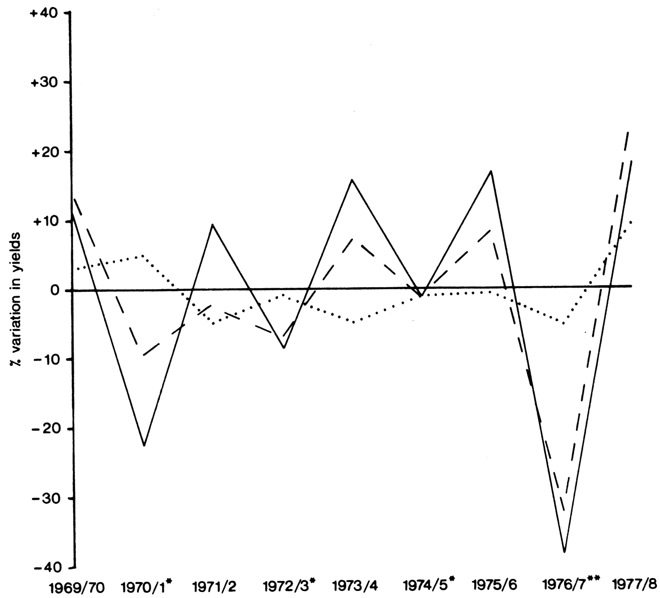


Figure 2.10 Yields of wheat, barley and lentil in coastal Thessaly between 1969–70 and 1977–8. _____ wheat; – – barley; . . . lentil; * low rainfall; ** drought (Halstead 1989: Fig. 5.2). Permission granted by Cambridge University Press.

against complete crop failure and hence contribute to the long-term survival of communities even when the harvest is poor. Their disadvantages are comparatively lower yields and high labour input when irrigation is required (Gallant 1991: 76–77).

Fruits were a seasonal addition to the ancient Greek diet and could be preserved through drying (e.g. figs) or through conversion into liquid form (e.g. olive oil, wine). Fruit trees may have been wild, managed or cultivated. Of the fruits mentioned in Figure 2.9, olive and grape are well adjusted to the Mediterranean climate, although grape vines generally require better soils and more frequent maintenance than olive trees (Zohary and Hopf 2000). While wild olive and vine may have been consumed from the Neolithic onwards, evidence suggests that olive cultivation probably only occurred in the late Middle Bronze Age (Hamilakis 1996; Riley 1999: 36–46; Runnels and Hansen 1986). Fig trees are a fast-growing crop and their fruits, fresh or dried, must have been one of the main sources of sugar during the Bronze Age.

Animals were of particular importance for human survival in the Mediterranean environment (Horden and Purcell 2000: 197–200). Domestic animals, such as sheep, goat, pig and cattle, are favoured by Mediterranean farmers for their versatility in producing meat, milk, wool and use for traction or transport. These strategies are not exclusive and several can be pursued at the same time. In addition, animals can be switched from one strategy to another should the need arise. After death, animals can supply meat, horns, and hide. Goat and pig are particularly useful animals as

pigs have a high birth rate and can easily be fattened up and both species feed on land that is of little interest for human cultivation. Sheep are more demanding in their food requirements, but provide wool. Cattle are good for traction, but require plenty of water and good quality grazing. The fact that meat can be preserved by drying, salting or curing makes animals – alive or dead – a handy cash crop.

A favoured strategy in the Aegean Bronze Age was to combine using domestic and wild animals (Figure 2.11). Trantalidou has shown that wild animals contributed to most communities' diets, but proportions varied from 2–3% to 23%, reflecting differences in availability and distinct subsistence strategies (1990: Table 2). However, not all wild animals would have been hunted for meat but might have been desired for their fur (badger, beech marten), their skills (wild cat as mouser) or their strength (*agrimi* – endemic wild goats – for cross-breeding purposes) (Jarman 1996: 217–218). Without doubt, domestic animals consistently contributed the largest proportion to Cycladic bone assemblages. Comparative proportions of domestic species, combined with information about their age at death, can provide further insights into specific strategies employed by the islanders (Figure 2.12). At Akrotiri, for instance, lack of juvenile cattle combined with an overall small number of cattle bones (approximately 9%) suggests the primary use of cattle as draught animals. Sheep/goat remains cover all age ranges, and a mixed strategy including dairy, meat and wool production has been suggested (Gamble 1978). Analysis of animal bones from the West House provides further evidence for this multi-use approach (Trantalidou 1990): pig, goat/sheep and cattle are represented in both the debris and destruction levels. Bones in the debris level indicate food consumption and add up to around 50% of all bones. The other 50% of bones can be found in the destruction level and are indicative of uses other than consumption. The overwhelming

Site	Period	Goat/ sheep	Pig	Cattle	Equid	Dog	Hare	Deer	Badger	Beech marten	Agrimi	Aurochs	Wild cat	Mouse	Bird
Akrotiri, Thera	LC I	*	*	*	*	*	*	*							*
Phylakopi, Melos	MC-LC II	*	*	*		*		*		*					
A. Irini, Kea	Late MC	*	*	*		*	*	*		*					*
A. Triadha, Crete	MM-LM	*	*	*			*	*	*	*		*			
Knossos, Crete	Minoan	*	*	*	*	*	*	*	*	*	*	*	*?	*	
Palaikastro, Crete	LM IA-LM IIIB	*	*	*	*	*	*	*			*				
Smari, Crete	MM-late Geom	*	*	*	*	*	*		*		*		*		
Tylissos, Crete	MM-LM II	*	*	*	*	*		*							

Figure 2.11 Animal bone remains at selected Aegean Bronze Age sites.

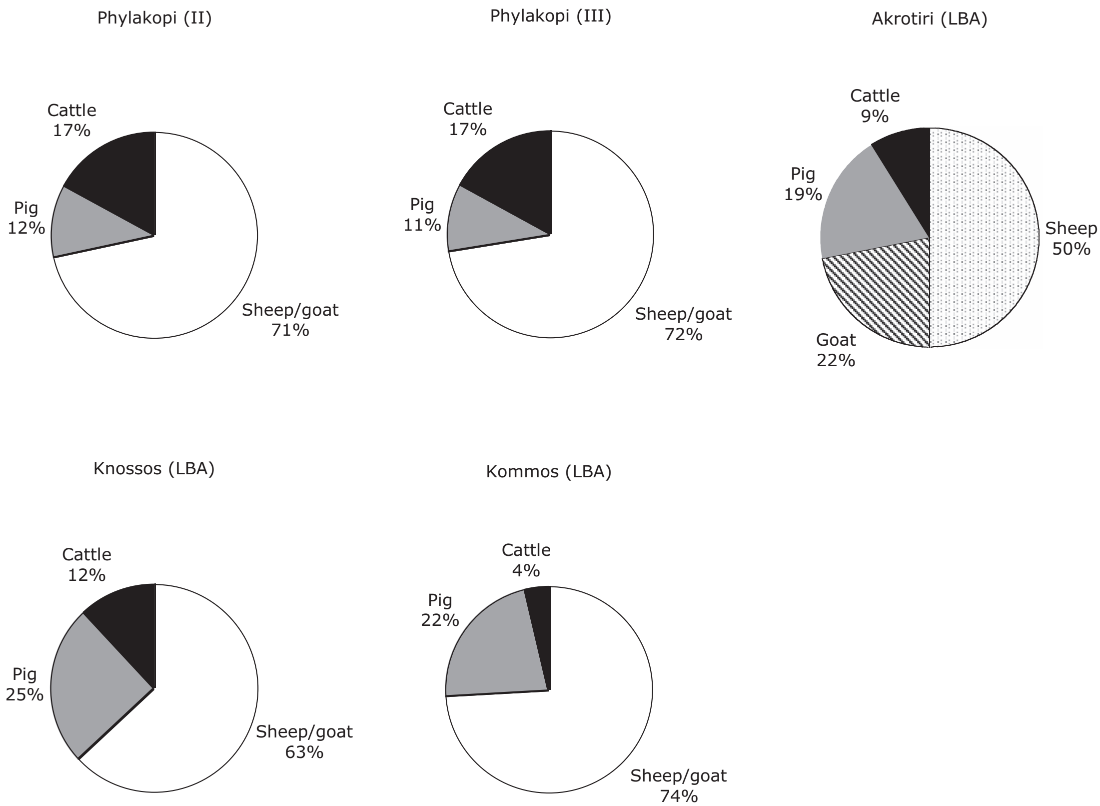


Figure 2.12 Composition of faunal assemblages from select Middle and Late Bronze Age sites (based on data from Gamble 1978, 1982 – but cf. Winder 1993; Halstead 1996: Table 1).

reliance on sheep/goat over cattle is probably an indication of the restrictions imposed on animal husbandry by limited rainfall.

While the sea is generally acknowledged as a source of food for Bronze Age populations, its importance has been regarded as either substantial or minimal. Some scholars argue that seafood was an important component of the ancient diet based on the proximity of settlements to the sea and rivers and highlight the large number of available fish with regular and predictable migration routes (Bintliff 1977: 117–118; Economidis 2000: 558). The lack of fish bones and shells from excavations is explained with reference to their fragility (they have long disintegrated), small size (they are not picked up by non-sieving excavation strategies) or food processing practices (for a summary of methodological problems, see Powell 1996: 36–40).

In contrast, those who regard the sea as being a poor food resource frequently point to the warmth and salinity of the Aegean basin, anecdotal evidence from ancient writers and the relative

unimportance of fish in the modern Greek diet (Braudel 1972; Gallant 1985). For example, based on modern fishing data Gallant has demonstrated that catch rates of pelagic fish are unpredictable and can vary by up to 100% due to their tolerance of only a narrow temperature range and great variation of their routes. In fact, pelagic fish may fail to make an appearance altogether over several years (1985: 30–36). Similar circumstances can apply to passive fishing methods (i.e. fishing from the shore) where fishermen depend on fish coming into the area. Here, catch rates will be even more unpredictable than for active fishing where fishermen can follow shoals by boat wherever they choose to go (Gallant 1985: 30–31). However, regardless of which technique was chosen, the labour-intensity and effectiveness of fishing and trapping equipment was only suited to produce small catches (Gallant 1985: 12–25; cf. Guest-Papamanoli 1983; Powell 1996: 82–166 for further evidence on past fishing methods and equipment). While the debate is ongoing, carbon and nitrogen isotope analyses of human bone indicate that seafood was probably only a minor contributor to the Greek diet from the Neolithic onwards and that the typical diet was predominantly terrestrial (Papathanasiou 2015).

Nevertheless, small amounts of fish continue to be consumed even in the Bronze Age. A comparison of fish remains from several sites shows that there was no unified picture regarding fish consumption as each island community consumed different proportions of different species of fish from different types of habitats. Multi-fishery is commonly observed and an overall predominance of fish from inshore or moderately deeper coastal water – caught with nets and hook and line – is apparent at most sites (Figure 2.13).

Because of fluctuations in the supply, fish could not be relied on as a staple food and has to be considered supplementary (Powell 1996; Gallant 1985; Gamble 1979). Fish is therefore comparable to other seasonally available foods, such as migrating birds, wild mammals and plants. Despite its comparatively low nutritional value, fish is a handy cash crop because some fish can be preserved easily for up to one year through drying, smoking, salting or pickling (Gallant 1985; Horden and Purcell 2000: 195).

Unlike fish, the preservation of marine invertebrates is generally very good in archaeological contexts and consequently our picture of their exploitation is more complete (Karali 1999). Most marine shells found in archaeological sites were collected from coastal habitats (Figure 2.14) – the exception being the Triton shell (*Charonia* sp.), whose habitat is the deep sea. The most common taxa are *Patella* sp., *Hexaplex trunculus/Bolinus brandaris* sp. and *Monodonta* sp. (Karali 1999 for a general overview). At Akrotiri, Thera, for instance, the most common species are *Murex* and *Patella* which add up to around 85% of the total shell assemblage. Most shellfish seem to have been eaten raw, used as fish bait or their shells used as ornaments (Karali-Yannacopoulou 1990). Discovery of several substantial murex deposits at various sites makes it likely that they were used for dye production (Reese 1987; Ruscillo 2006). In addition to species that leave easily recognised archaeological traces we should also assume the consumption of sea urchins, crabs, cuttlefish, octopus, etc. – commonly depicted images of Bronze Age art (Karali 1996; Powell 1996: 62–66).

Fish taxa	**Akrotiri**	**Kommos**	**Mochlos**	**Palaikastro**	**Pseira**	**Habitat**
Period	LC I	MM IB–LM II	LM IB	MM II–LM IIIA	EM III–LM I	
Apogonidae Cardinalfish		*		*		Coastal lagoons
Atherinidae Silverside				*		Shallow, littoral
Blenniidae Blenny			*	*		Demersal, littoral
Carangidae Mackerel	*	*		*		Pelagic; seasonally migratory
Carcharhinidae Shark, ray		*				Epipelagic
Centracanthidae Picarel	*		**	**	**	Inshore
Dasyatidae Stingray				*		Demersal, littoral
Gadidae Shore rockling		*				Demersal, sublittoral
Labridae Wrasse		*				Demersal, littoral
Mullidae Red mullet				*		Demersal, littoral
Pomacentridae Damselfishes				*		Demersal, littoral
Scaridae Parrotfish		*	*			Littoral
Sciaenidae Meagre				*		Demersal, littoral
Scombridae Tunny	*	*				Pelagic; seasonally migratory
Serranidae Sea bass		**	*	**	*	Demersal, inshore
Sparidae Sea bream	*	**	**	**	**	Demersal, off/ inshore
Sphyraenidae Barracuda		*	*			Littoral

Figure 2.13 Fish remains from selected Middle and Late Bronze Age sites (for a general overview, see Mylona 2003). * Presence of fish taxa in assemblage; ** dominant species in assemblage.

Mollusc taxa	**Akrotiri**	**Ayia Triadha**	**Kommos**	**Mochlos**	**Palaikastro**	**Pseira**	**Nichoria**
Period	LC I	MM-LM	MM-LM IIIA	LM IB	MM I-LM II	EM III- LM I	MH-LH II
Arca noae (Ark shell)		**					
Cardiiae (Cockles)							*
***Charonia* sp.** (Triton shell)	*	*		*	*	*	
Dentalium (Tooth shell)							**
Euthria corneum (Spindle Euthria)							
***Glycymeris* sp.** (Dog-cockle)	*	**	*				
***Monodonta* sp.** (Topshell)	*		*	**		*	
Murex trunculus/ Brandaris (Murex shell)	**		**	*	**	*	*
***Patella* sp**. (Limpet)	**	*	**	**		**	

Figure 2.14 Major taxa of marine invertebrates at selected Bronze Age sites. **Dominant taxa; *taxa present in moderate amounts. Other taxa are present only in smaller numbers.

HEALTH

The health of prehistoric populations cannot be assessed directly, but has to be understood as the end product of a variety of factors, many of which do not leave recognisable traces in the archaeological record (Bush and Zvelebil 1991). As virtually no human skeletal material has come to light from the Aegean islands, this summary draws heavily on skeletal evidence from Crete and the Greek mainland.

Mortality rates are one of the key indicators of the overall health of a society, and are a reflection of the 'stresses' to which people are exposed, their resistance to them and their ability to carry out successful medical interventions. Despite regional differences, there are several broader patterns that emerge from the data. For example, child mortality rates were high with poor hygiene, inadequate nutrition, population nucleation and only basic medical care the most likely explanation (Halstead 1977). The average age of death was not much above 30, and women had a shorter life expectancy than men as many died during their childbearing years (Figure 2.15). Women had their first child in their teens, and bore on average 5.5 children with annual births not being uncommon (Angel 1971; McGeorge 1992). Only a small proportion of the population survived beyond the age of 50.

Alongside mortality, height is considered a good indicator of a community's nutrition and general health (Figure 2.16). The greater height of the Shaft Graves occupants at Mycenae in comparison with

Site	Period	Male	Female	Sample size
Knossos	MM	n/a	28.3	M:- F:46
Asine (excavations of 1970s)	MH	34.9	27.5	M:16 F:12
Asine (excavations 1920–1974)	MH	35.4	30.4	M:30 F:20
Lerna	MH	37	31	M: 57 F: 47
Mycenae, Shaft Graves	MH–LH I	35.3	34.3	M:19 F:3
Knossos	Neopalatial period	35.4	n/a	M:54 F:-
Nichoria	LH II	30.1	31.4	M:15 F:16
Armenoi	LM III	30.7	27.3	M:143 F: 107
Chania	LM III	34.1	25.6	M:7 F:9

Figure 2.15 Average age of death at selected sites in the Bronze Age Aegean (Berg 2007a: Table 8 with references).

Site	Period	Male (cm)	Female (cm)	Sample size
Asine	MH	164.6	153.6	M: 20 F: 13
Lerna	MH	166.3	154.2	M:38 F:27
Kato Zakro	MM	167	157.5	n/a
Mycenae, Shaft Graves	MH-LH I	171.5	158.8	M: 15 F:4
Nichoria	LH II	170.3	165.8	M:5 F:2
Athens	LH	167.4	155.4	M:11 F:9
Pylos	LH	166.7	152.1	M:4 F:7
Armenoi	LM III	167.6	154.6	M:107 F:68
Chania	LM III	164.5	148.8	M:4 F:3

Figure 2.16 Average male and female height at selected Bronze Age sites (Berg 2007a: Table 9 with references).

their contemporaries from Lerna, for example, is likely to reflect dietary differences between an elite with regular access to meat, dairy and fish, and the general population with a primarily vegetarian diet (Angel 1973). Similarly, population density, living conditions and differential nutrition are reasons put forward for the observed height differences between taller individuals in rural Armenoi and smaller skeletons from urban Chania on Crete (McGeorge 1992).

Despite access to a wide range of food types, malnutrition and nutritional deficiencies were common among prehistoric populations (especially women who are more vulnerable during pregnancy and lactation) because commonly stored foods like cereals, pulses, figs, raisins, dates, honey and olives are all generally deficient in iron, Vitamin C and calcium (McGeorge 1990: 424). The quality of past food supplies can be inferred indirectly from organic residue analysis, stable isotope analysis, palaeobotany, average human height and tooth wear. However, the most direct indicator of malnutrition and/or disease are lines of temporary arrest of tooth-enamel formation which occur during childhood and indicate childhood growth disturbance. Such arrest lines are present to a slight or severe degree in 61% of the MH Lerna adult sample and at LH II Nichoria arrest lines were visible in 46.7% of the population (Angel 1971; Bisel 1992). At LM III Chania virtually every individual was affected by growth disturbances, most likely as a result of a poor weaning diet or childhood growth spurts (McGeorge 1992). Diet also had an impact on dental health. Extensive wear, large-scale tooth loss and high incidences of caries are typical for populations eating a coarse milled cereal diet and seem to affect almost every individual in the Aegean Bronze Age (Carr 1960; McGeorge 1988). Again, the Shaft Grave elite is shown to have superior health with a less dental disease than their contemporaries from Lerna (Angel 1971, 1973; Bisel and Angel 1985).

For diseases to be recognised, they need to leave identifiable stress marks on the skeleton. Unfortunately, this requirement imposes severe limitations on the researcher as different diseases can leave similar stress marks behind or, alternatively, some diseases may not leave any stress marks at all. In addition, scholars may sometimes be unable to differentiate between acute stresses, genetic and adverse environmental factors. Finally, the preservation of bone material may vary between children and adults, favouring the more robust skeletons. Despite these limitations, a wide range of diseases has in fact been identified (Figure 2.17).

Malaria and iron-deficiency anaemia of nutritional origin may leave behind small cranial lesions (so-called porotic hyperostosis) (Angel 1971, 1973). According to Angel, the incidence of cranial lesions reduced from 60% in Early Neolithic Nea Nikomedia to 20.4% in MH, indicating a general improvement in the population's health (1971: 77–84; cf. Bisel and Angel 1985). That elites had better general health is apparent when comparing skeletons bearing traces of porotic hyperostosis from MH Lerna (20.4%) with those from the elite Shaft Graves (8%) (Angel 1971). At the non-elite LM III cemetery from Chania, 31.8% of all adult skulls showed such lesions (McGeorge 1992).

Hypertrophy, hypertrophic arthritis and exostoses are indicators of joint responses to hard use and affected up to 75% of males and 50% of females from MH Lerna. Arthritis of joints, hands or feet may reflect occupational strain or repetitive tasks, deformity or healed fracture and is present in 41% of males and 18% of females in MH Lerna (Angel 1971). Traumatic arthritis was present in 18.7% and vertebral arthropathies in 75% of all individuals from LM III Chania (McGeorge 1992). Being seaports, newly arriving settlers, itinerant craftsmen and traders would have brought the islanders into frequent contact with new pathogens with the potential to develop into fully fledged epidemics. Possible evidence for

Arthritis and degenerative diseases of the bone:	*Infections and infectious diseases*:
Osteoarthritis and degenerative joint disease	Staphylococcal infection
Traumatic arthritis	Salmonellosis
Spinal osteophytosis	Osteomyelitis
Forestier's Disease	Carbuncle
Bilateral temporo-mandibular degenerative disease	Tetanus
Spondylitis, ankylosing and degenerative	Tuberculosis
Spondylolisthesis	Brucellosis
Perthes' Disease	Poliomyelitis
Congenital disease and deformities:	Maxillary sinusitis
Hydrocephaly	Bacterial spondylitis
Microcephaly	Mastoiditis
Paget's Disease (Osteitis deformans)	*Anaemia and malaria*:
Neoplastic disease:	Falciparum malaria
Osteosarcoma	Thalassaemia
Metastatic bone cancer	Sickle-cell anaemia
Dental disease:	Paediatric anaemia
Dental caries	*Other metabolic diseases*:
Periodontal disease	Gallstones
Dental abscess	Avitaminosis
	Osteomalacia
	Rickets
	Scurvy
	Gout

Figure 2.17 Diseases and medical conditions present in Bronze Age Greece (after Arnott *forthcoming*). I would like to thank Robert Arnott for allowing me to publish the data in advance of his own publication.

an epidemic comes from Tomb 11 at LM III Chania where an adult female was buried with 5 children. McGeorge (1992) argues that an unidentified epidemic was the most likely cause as all six individuals died around the same time.

Not only were diseases manifold and frequent in prehistoric Greece, but their impact on families was greater than in modern times. For example, satisfactory healing of diseases may require total rest for several weeks or even months. Thus, any individual affected would have been completely dependent on the community and unable to contribute labour – potentially resulting in lesser provisions for the family – or be faced with the consequences of a life-long disability if healing time had to be cut short due to labour demands. Equally, many acute diseases are nowadays managed effectively with the help of drug treatment or with surgery, but without such treatment might have developed into a chronic and severe condition.

In addition, general living conditions may have made people more susceptible to diseases. For example, lack of sanitation, especially in urban settings, would have resulted in increased contact with parasites and contaminated water supplies. Unhygienic conditions and high population densities could have providing a fertile breeding ground for infectious diseases (Arnott 1996, 2004). Equally, seasonal malnutrition may have affected the overall health; women, in particular, are more vulnerable to disease due to a weakened immune system in childbearing years and bone changes (osteoporosis) during and after menopause.

Fractures, wounds and various injuries are visible in most excavated collections of human skeletal remains, including those from Lerna, Asine, the Grave Circle B at Mycenae and the LM IIIA/B cemetery at Armenoi, Crete. Grmek estimates that more than 10% of human bones from the Aegean Bronze Age were fractured with a female:male ratio of 1:4 (1989: 57). In order for fractures to heal successfully, they need to be reduced, immobilised and stabilised. Knowledge of these basic medical skills is evident in the skeletons on Crete from EM onwards (McGeorge 1988). In addition to setting and manipulating of bones, basic surgery probably also included the removal of foreign bodies and use of bandages, plaster, splint and supports (Arnott 1997). Basic knowledge of dental surgery is known from Minoan Crete and is visible in healed broken jaws, and successful (as well as unsuccessful) tooth extractions (Carr 1960; McGeorge 1988, 1992). The occurrence of trepanation, a hole cut into the skull normally achieved by scraping away the layers of the skull with the possible aim to reduce pressure on the brain, attests to existence of sophisticated surgical skills on Crete and on the Greek mainland, although most individuals died during or shortly after the procedure (Angel 1971; Arnott 1997). The only preserved surgical kit with scissor, tweezer and knife comes from LH IIB Nauplion (Protonotariou-Deilaki 1971). Arnott suggests that readily available obsidian tools would have been sufficient for most procedures; bandages could have been made of linen and medicinal plants could be made into potions and lotions – as seen at Chrysokamino where metal workers prepared herbal lotions to help alleviate the symptoms of potential arsenic poisoning (Arnott 1997, 1999). Based on evidence for medical intervention and surgical instruments, Arnott (2002) has argued for the existence of medical practitioners and healers in the Aegean Bronze Age.

CONTEXTUALISATION: THE RELATIONSHIP BETWEEN GEOGRAPHY AND ISLANDERS

Some would argue that, unlike land where the boundaries of cities and regions are blurred as people, goods, and traditions are rapidly moving between locales, an island is an unambiguously defined geographic entity where the borders are clearly demarcated, and it is easy to know who is local and foreign. To reach an island, the sea must be traversed which takes time, equipment and knowledge. An island is thus the primal insular place in which traditions, patterns and behaviour can be scrutinised and understood with greater clarity than in the confusing web of interactions so typical of a larger land-based territories.

This view of islands as insular places is derived from principles developed in the context of biological studies first formulated by Darwin and Wallace in the 19th century. Both scholars came independently to the conclusion that islands are advantageous places for the study of general evolutionary and ecological processes as islands were isolated, closed systems and enjoyed 'light natural selection', resulting in fewer animal or plant species, less competition and, not infrequently, endemic species, thus simplifying study, analysis and interpretation (Darwin 1859; Wallace 1869, 1892).

Founded on Neo-Darwinian approaches, MacArthur and Wilson's seminal book *The Theory of Island Biogeography* (1967) investigates the factors involved in the colonisation and subsequent evolutionary development of animal and plant species on islands and, more generally, island-like locations (e.g. forests, streams, caves, tide pools). The authors argued that the potential of islands lay in their convenient laboratory-like experimental conditions – "a simple microcosm of the seemingly infinite complexity of continental and oceanic biogeography" (MacArthur and Wilson 1967: 3). MacArthur and Wilson

identified several key effects and relationships that could explain contrasting plant and animal species distribution between islands and mainlands: 1) species-area relationship, 2) species-distance relationship, and 3) dynamic equilibrium.

1 Species-area relationship (Figure 2.18): a consistent relationship exists between an island's area and the number of plant or animal species it can support. This is based on the recognition that a larger island has more environmental niches and can therefore support a greater range of species than a smaller island. Likewise, a larger island can support more individuals from a given species, making its extinction less likely than of the same species living on a small island.
2 Species-distance relationship: there is a strong and predictive relationship between the number of species present on an island (as well as the speed of migration) and the island's distance from the mainland. Based on the travel range of any given plant or animal species, nearby islands have a greater chance of being settled than those that can only be reached by flying or being dispersed by strong and lasting winds. However, intermediate islands can act as stepping stones to more distant islands, thus increasing the dispersal range for less mobile species.
3 Dynamic equilibrium (Figure 2.19): the size of an island determines the maximum number of species able to make a home on it at any one time. This range of species is in continuous turnover, with

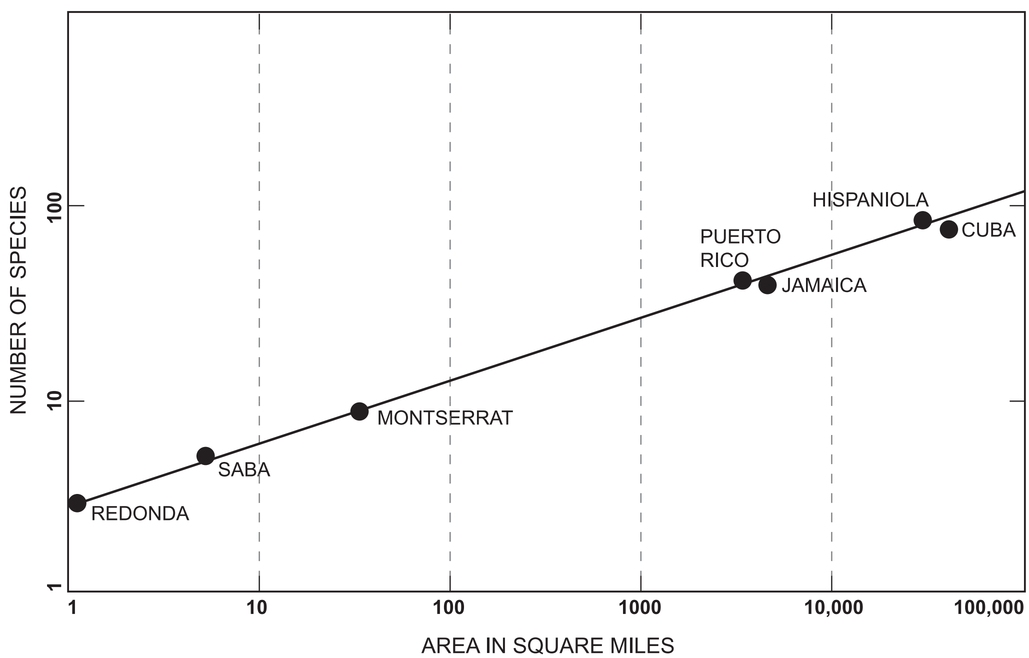


Figure 2.18 Species-area relationship of West Indian amphibians and reptiles (after MacArthur and Wilson 1967: Fig. 2).

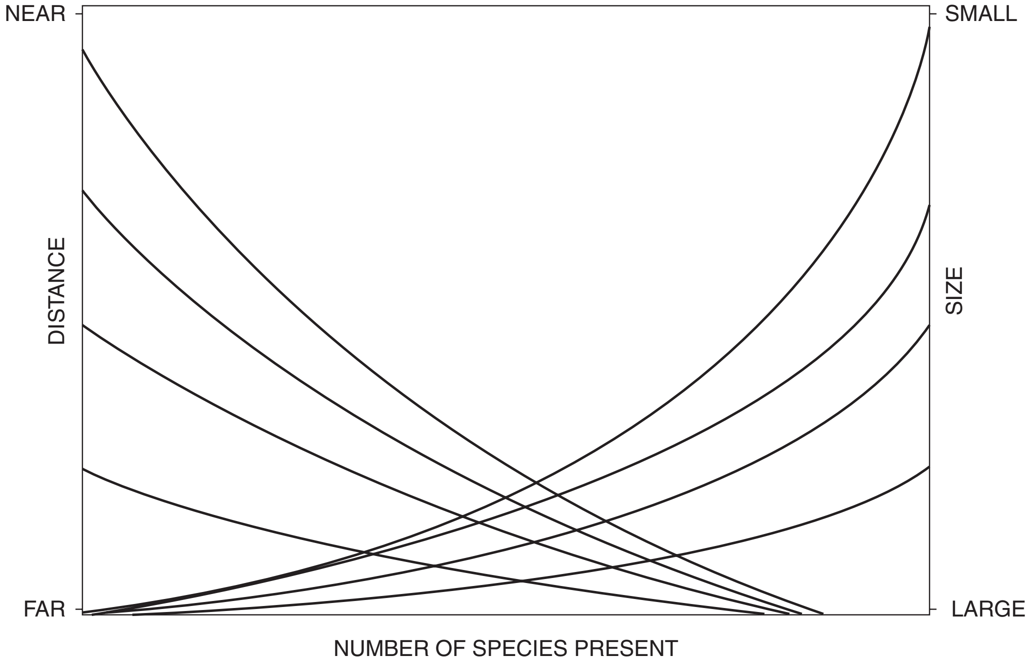


Figure 2.19 Equilibrium models of biotas of varying island sizes and distances from mainland (after MacArthur and Wilson 1967: Fig. 8).

> new ones migrating to the island and existing ones becoming extinct. The rate of new arrivals and extinctions is in a state of dynamic equilibrium – ever-changing in the composition of species but relatively constant in the total number.

Originally developed exclusively to explain animal and plant distributions on islands, anthropologists began to apply the concept of island biogeography to *human* colonisation scenarios in the 1950s and 1960s. Arguing that humans are ultimately also animals, they believed that human populations would be subject to similar constraints when colonising islands as plants and animals (for a summary, see Terrell, Hunt and Gosden 1997: 156–163). Archaeologists began to make use of biogeographical approaches in the 1970s when Evans introduced the concept of 'islands as laboratories' into archaeological discourse and set out human equivalents for the animal/plant-island relationships (1973, 1977). These included the assumption that 1) islands are closed systems that exist in isolation, 2) that limited ecological resources available on islands force human settlers to adjust to a less diverse range, and makes imports stand out clearly, 3) that island groups allow scholars to compare the development of discrete communities, chart their degree of contact and isolation, and 4) that humans isolated from contact with other people often preserve archaic traditions or may develop idiosyncratic rituals or express their isolation through exaggerated behaviour (Evans 1973).

Despite being heavily indebted to biogeographic concepts, Evans acknowledged the difference between human and animal/plant inhabitation and recognised that cultural attitudes towards the sea play a big part in determining the degree to which an island isolates itself. Followers of Evans' concept of 'islands as laboratories' in archaeology and anthropology unfortunately often ignored the existence of a cultural dimension and continued to conceptualise island societies as closed and bounded systems (e.g. Clark and Terrell 1978; Fitzhugh 1997; Kirch 1980; Terrell, Miller and Roe 1977).

In the Aegean islands, several field surveys made explicit reference to Evans' 'islands as laboratories' view. The Melos survey, for example, regarded the island as a clearly defined area equipped with limited resources, "facilitating a systemic approach which permits a clear distinction between interactions within the system and those with neighbouring systems operating across its boundaries" (Renfrew and Wagstaff 1982: 1). Likewise, the Northern Keos survey argued that

> islands lend themselves to the relatively objective operational definition of both population and available resources. [. . .] Many authors have emphasized the laboratory-like conditions of comparative research in insular settlings; and where [. . .] there exists the possibility of observing the development of discrete yet related polities and of studying the long-term effects of differences among them in size, position, environment, natural resources, and so on.
>
> (Cherry, Davis and Mantzourani 1991: 9)

The legacy of single island field surveys is a strong and long-lasting one with most recent surveys following the biogeographic paradigm implicitly (Broodbank 1999) or explicitly (Bevan and Conolly 2013). However, some scholars are breaking the mould and have expanded their investigation to interconnections within a wider region, such as the Eastern Korinthia Archaeological Survey (Tartaron et al. 2006) and the Keros Island Survey that has just began to explore also the island of Naxos to situate Keros in its wider Cycladic context.

Following a period of critique, MacArthur and Wilson's concept of biogeography became modified and elaborated on in the 1970s and 1980s (Diamond and May 1981; Losos and Ricklefs 2009; Simberloff 1974; Williamson 1981), leading to a revival in the 1990s. In its new incarnation, islands were no longer viewed as closed, but semi-closed systems – thus acknowledging the importance of the islander's cultural attitudes. However, environmental and ecological variables were still regarded as exerting constraints on island communities, but in a non-deterministic manner. By the 2000s, however, many scholars had come to conclude that humans do *not* act like animal or plant populations and that islands therefore were neither closed nor semi-closed, but open systems. This recognition ultimately led to a rejection of the model for human societies in most anthropological and (to a lesser degree) archaeological circles (Broodbank 2000a; Terrell 1997).

These scholars argued that no island inhabited by humans is a closed system that exists in isolation. In contrast to flora and fauna, whose dispersal is indeed governed by biological and physical constraints, humans can choose their degree of interaction and contact. In support of their claim, scholars have pointed to ethnographic, archaeological and experimental data which all demonstrate that humans

regularly seek interaction with neighbouring regions even in the most remote locales (Broodbank 2000a: 7–18). An often-cited example is the island of Mauritius, 1,000 km from mainland Africa, which has been populated by communities from India, Africa, China and Europe, indicating the existence of wide-ranging communication and contact networks (Eriksen 1993).

Likewise, there is no reason to assume that humans would limit themselves to using resources that can only be found on the island. Instead, the import of foodstuff, raw materials and trade goods was a regular practice as is demonstrated by the example of Aigina. According to scholarly estimates, the island would have been able to support approximately 5,000 inhabitants if relying exclusively on locally grown produce. Instead, the island supported 35,000 people at around 500 BC which must have required considerable imports of foodstuff to maintain the population (Figueira 1981; Horden and Purcell 2000: 119). A Bronze Age example can be found in the islet of Pseira, around 2.5 km north of Crete, whose inhabitants had to import virtually all of their food and materials, possibly even water, from Crete throughout its entire existence (Betancourt and Banou 1991). Even when an island's resources are relatively limited and are not supplemented by imports, we should not assume that this created greater hardship than in comparable mainland contexts – in fact, because of an island's closeness to the sea some authors would argue that the nutritional base of islanders has always been better than for mainland communities (Patton 1996: 82). The Neolithic settlement of Saliagos, which relied heavily on fishing alongside agriculture, may point to such a practice.

Evans' final assumption about island societies was that humans isolated from contact with other people often preserve archaic traditions and may develop idiosyncratic rituals or express their isolation through exaggerated behaviour (e.g. investment in building projects) (see Evans 1973). This last concept draws its inspiration from an article by Sahlins (1955), who was attempting to explain the construction of the large stone statues on Easter Island and coined the phenomenon of exaggerated building programmes 'esoteric efflorescence'. There is no direct parallel in biogeography for Evans' postulate, but he may have thought of the biologically observed phenomenon of relic and endemic species frequently found on islands and the development of exaggerated animal forms, either as giants or dwarfs. Unlike evolutionary adaptations by animals and plants, however, research has demonstrated that human idiosyncracies were not adaptations to insularity but were learnt (Rainbird 1999). The building of temples in Neolithic Malta, for instance, was not an exaggerated endemic development due to the island's isolation but rather a culturally enforced isolation by the islanders themselves *in order* to enhance certain social strategies, such as the building of large monumental temples (Stoddart et al. 1993). Culturally regulated isolation is also visible on Cyprus during the Khirokitia phase. While there is evidence of imports and contacts with the mainland during the preceding 9th and 8th millennium BC, the absence of cattle and pottery, and the general lack of imports during the seventh millennium BC indicate a conscious rejection of mainland features (and thus creating the illusion of isolation) as an expression of local identity (Broodbank 2000a: 20).

As the preceding discussion shows, an island's relationship with the surrounding world is highly complex and can range from almost total isolation (e.g. Easter Island; generally perceived to have been the most isolated island) to almost complete integration with the outside world (e.g. Manhattan), though

Figure 2.20 The poles of island insularity.

most island communities will be located somewhere between the two extreme poles (Figure 2.20). As this relationship is not governed by biogeographic principles, it can change dramatically over time as in the case of Cyprus. Movement in either direction is possible and may be slow or rapid, gradual or in jumps, and may not necessarily follow the same direction (Broodbank 2000a: 10). Insularity is therefore best conceptualised as man-made, relative and in constant flux; and as such it can be used as a means to express facets of individual or group identity (Eriksen 1993; Rainbird 1999: 230).

3

THE FIRST PEOPLE

The Palaeolithic and Mesolithic periods

The Palaeolithic is the name for the oldest cultural period of the European Stone Age that began about 1.3 million years ago and ended in Greece at about 9,500 BC. It is characterised by the first production and use of stone tools by hominids. During the Lower Palaeolithic (ca. 1,300,000–250,000 BC) the first tools were made by removing flakes from crude cores with a hammerstone. They were most likely used for cutting and chopping meat off a carcass. Despite the long time span, few changes occurred in the manufacture and design of these basic tools. It is only with the appearance of the Acheulean tradition of tool manufacture at ca. 500,000 BC that we see greater diversity in tool designs, such as the appearance of handaxes. In Europe, this is associated with the appearance of a new type of human, *Homo heidelbergensis*. The Middle Palaeolithic dates to ca. 250,000 and 40,000 BC, and is associated with Neanderthals. Neanderthals used a variety of flake, prepared flake and blade technologies, but are most frequently associated with the Levallois technique of tool manufacture which involves preparing a distinct domed core before a flake or point of the desired shape is removed. They made a variety of tool types, scrapers and, at certain times, small handaxes. By the Upper Palaeolithic (ca. 40,000–9,500 BC), *Homo sapiens* is fully established and a great variety of tool cultures can be recognised. The best-known manufacturing traditions are Aurignacian, Gravettian and Madgalenian, which show considerable skill in the production of their tools.

Until the 1960s Palaeolithic research in Greece was characterised by short-term projects and chance finds. Since then, regional surveys and long-term research projects, such as that at Franchthi Cave, have allowed us to gain a much better understanding of human interaction during this vast time span. Despite increased interest in this time period, scholars often comment on the lack of Palaeolithic sites and attribute it to the paucity of dedicated and long-term research projects on one hand and the poor visibility of sites on the other. Also obscuring the evidence are both anthropogenic and geologic factors, such as small site sizes, seismic uplift or subsidence, erosion and eustatic sea level rise. The situation is further exacerbated by lack of firm stratigraphic association which can result in very wide date range estimates (Runnels 1995: 702–704).

LOWER PALAEOLITHIC (1,300,000–250,000 BC)

There is currently no unambiguous evidence of a human presence in Greece during the Lower Palaeolithic (Tourloukis and Karkanas 2012). Whether this lack of finds is an accurate representation of human distribution at the time or the consequence of tectonic, seismic or geological activity is a topic of debate among scholars. The earliest confirmed occupation of Greece occurred sometime between 350,000 and 150,000 BC and could thus be either of Lower or Middle Palaeolithic date (Figure 3.1). The most reliable evidence we have for this time span is a *Homo heidelbergensis* skull from Petralona Cave and a handaxe with associated finds from the open-air site at Kokkinopilos, both in northern Greece. Likewise, the absence of Mousterian or Levallois stone tool features and the estimated radiometric date of 350,000 BC for the river terrace assigns the lithic assemblage of Rodia in Thessaly reasonably firmly to the Lower Palaeolithic. However, the exact layer in which these lithics were found is debated and no

Figure 3.1 Map of key Lower Palaeolithic findspots.

direct date exists. Sporadic finds of Acheulean handaxes and other lithic artefacts exist at Palaeokastro in Macedonia, Aliakmon River in Macedonia, Langadas in Thessaly, Alonaki in Epirus, Ormos Odysseus in Epirus, and Peiros River valley in the Peloponnese. Two partial skulls from the Apidima Cave are likely to belong to *Homo heidelbergensis* and can be dated approximately to 400,000–105,000 BC. As these are finds without contextual or stratigraphic information, they cannot do more than hint tentatively at a possible human presence before 200,000 BC (Harvati et al. 2009).

MIDDLE PALAEOLITHIC (CA. 250,000–40,000 BC)

In contrast, evidence of Middle Palaeolithic habitation of Greece – with its characteristic Levallois stone manufacturing technique – is comparatively continuous and dense (Figure 3.2). Harvati and colleagues

Figure 3.2 Map of key Middle Palaeolithic findspots.

estimate that 200 inland, coastal and island sites and findspots in almost every region of Greece can be dated to this time period (2009: 132). With many of the sites not fully published or without reliable dates, the sequences of the following five caves which are dated by radiometric methods form the backbone of our chronological range.

Theopetra Cave in Thessaly has yielded the oldest stratified artefact deposits with an approximate date of 130,000 BC. It also preserved footprints with some kind of a 'cover' in a context associated with Mousterian lithics and is thought to indicate the presence of a Neanderthal child. This is the oldest known example of footwear anywhere in the world. The Cave of Asprochaliko in Epirus provides one single date of ca. 100,000–90,000 BC for a Levallois assemblage; the later Mousterian industry is dated to ca. 40,000 BC. Cave 1 of the Lakonis Cave complex, Peloponnese, has dense occupation layers with hearth structures dating between ca. 100,000 and 40,000 BC. A similar chronological range has also been postulated for the Cave of Kalamakia in the Peloponnese. Undated as yet are the Middle Palaeolithic layers in the Cave of Klissoura in the Argolid.

Unstratified surface finds and undated or as yet unpublished assemblages have been reported from many further findspots: Cave of Maara and Langadas in Macedonia; Kokkinopilos, Thesprotia and the Preveza region in Epirus; Kephalari Cave and the Berbati-Limnes valley in the Argolid; Kokkinovrachos in Thessaly; as well as several small sites in Achaia.

During the Palaeolithic, sea levels were up to 130 m lower than today (Figure 3.3). This changed the entire landscape and, in addition to reducing distances between the mainland and islands and between islands, it also exposed expansive coastal stretches now under water. The most notable difference, however, is the existence of a central 'Cycladean Island' which conjoined many of the now separate Cycladic islands. In contrast, Crete has been a true island for the last 5 million years. Until very recently, there was no evidence of Lower or Middle Palaeolithic occupation on the Greek islands and scholars considered the sea essentially a barrier to human movement (Broodbank 2006). However, the discovery of 200 Palaeolithic handaxes, cleavers, cores and flakes (dated to 110,000–50,000 BC) from nine sites in the Preveli area of southern Crete confirms that humans had crossed wide stretches of the open sea in this region already during the Middle Palaeolithic (Strasser et al. 2011).

Other islands have also revealed finds of possible Middle Palaeolithic date, notably Euboea, the Sporades (Alonnisos, Gramiza, Psathoura), Ionian Islands (Kephalonia, Corfu, Zakynthos, Ayios Petros, Meganisis, Thileia, Kythros and smaller islets), Lesvos, Lemnos, Thasos and Ayios Eustratios in the northern Aegean, and potentially Melos and Naxos in the Cyclades. However, even though these locations are islands nowadays, most of them were attached to the mainland during the low sea levels of the Palaeolithic. Only Kephalonia, Zakynthos, Alonnisos and Melos would have been true islands then, necessitating a journey across the sea. Naxos was located in the centre of the Cycladean Island which could only be accessed by crossing the sea. The open sea sections to be crossed by hominins ranged from short crossings (2–3 km to Zakynthos, 5–12 km to Kephalonia, 7–10 km to Melos) to longer distances (10–20 km to the Cycladean Island; multiple 10–25 km crossings to Crete) that would have required at least one full day's paddle.

While the presence of stone tools is now incontrovertible and demonstrates the presence of hominins on islands, scholars remain divided about the interpretation of this phenomenon. The maximalist position is taken by Runnels (2014) who argues that the frequency of findspots indicates that these seagoing

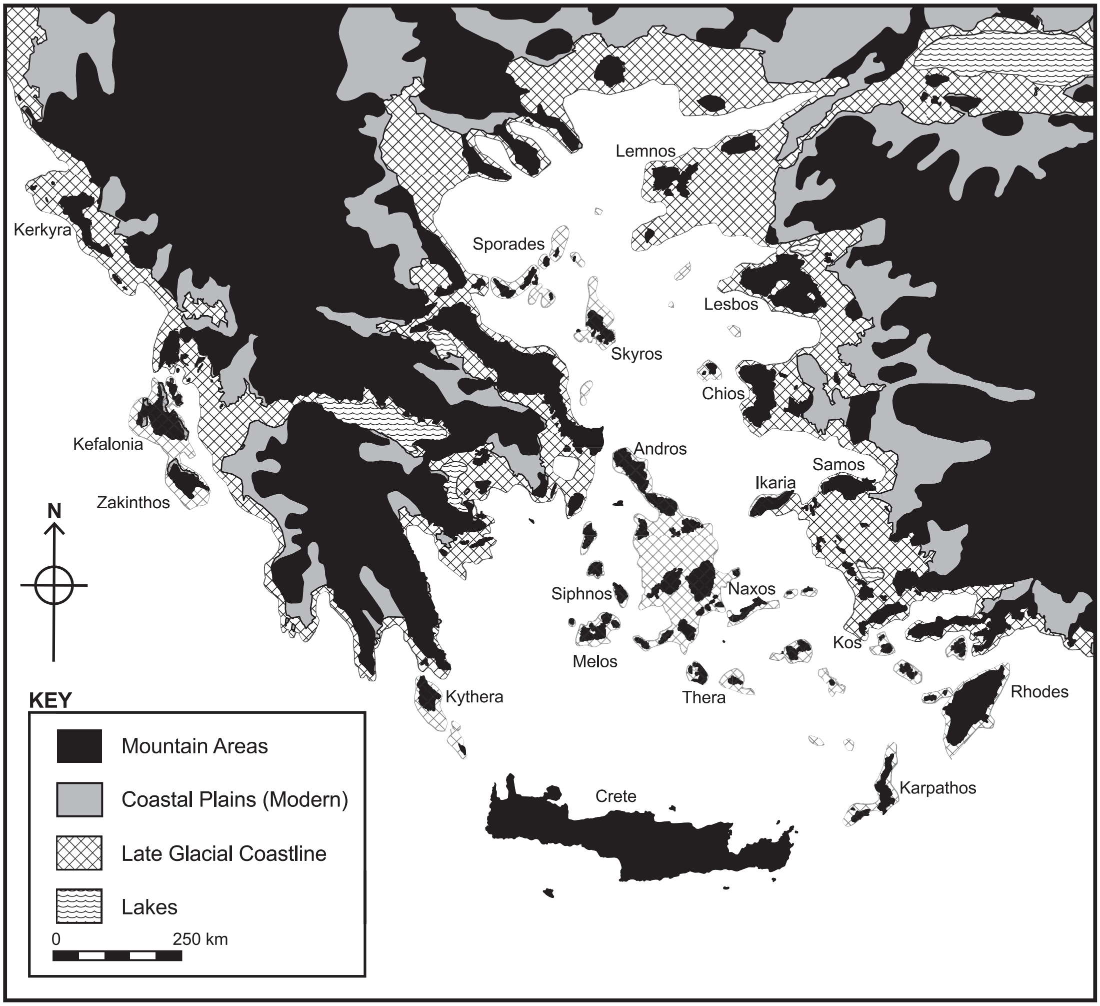


Figure 3.3 Reconstruction of Aegean at maximum glacial sea level lowstand ca. −130 m (after Van Andel and Shackleton 1982: Fig. 2).

ventures were planned rather than accidental. If they were indeed the result of strategic decision-making, then the hominins involved possessed boat-building skills, navigation skills and a cognitive ability to plan the crossing and calculate its potential benefits. In a follow-up article Howitt-Marshall and Runnels (2016) provide the necessary supporting evidence, such as the demonstrable exploitation of marine environments by archaic hominins, their proven cognitive abilities in adapting to new environments and in teaching ever-more complex lithic technologies, and their competence in using sharp-edge cutting tools, fire and cordage – all essential technologies for the manufacture of basic rafts. A proponent of the minimalist position is Leppard (2014) who postulates that archaic hominins did not yet possess the required cognitive abilities and that therefore the finds are the result of accidental drift

scenarios. Planned seagoing ventures, he states, can only be envisaged from ca. 50,000 BC onwards with the presence of anatomically modern humans who had developed the necessary cognitive abilities. An intermediate position is take by Phoca-Cosmetatou and Rabett (2014) who argue that planned short-term visits to remote locales is more in keeping with the mobile hunter-gatherer strategies utilised by hominins in mainland settings – at least during the Middle and Upper Palaeolithic. During the Lower Palaeolithic, their cognitive abilities were probably not sufficiently developed and any archaeological evidence would be the result of accidental drift scenarios. In fact, the Aegean archipelago, with its many island clusters separated only by short crossings and with the destinations often clearly in sight, make the Aegean the ideal seagoing nursery.

UPPER PALAEOLITHIC (40,000–9,500 BC)

The Upper Palaeolithic in Greece is associated with early forms of anatomically modern *Homo sapiens*. The earliest Upper Palaeolithic culture is called Aurignacian (ca. 40,000–28,000 BP) and is extremely rare in Greece (e.g. Lakonis Cave, Franchthi Cave, Klissoura Cave I). The reason for this striking absence of sites is attributed to the harsher winter climate. The subsequent Gravettian period (ca. 28,000–23,000 uncal BP) is equally poorly represented (e.g. Asprochaliko, Kastritsa, Grava, Theopetra and Franchthi Cave). Following the arrival of warmer conditions during and after the Last Glacial Maximum around 20,000 uncal BP, archaeological remains become more visible during the epi-Gravettian and testify to a wider occupation of Greece as people abandoned northern and central Europe and moved into southern Europe and the Mediterranean regions (Figure 3.4). It is only around 12,700 BC that temperatures rose more substantially to approach those of the present day.

Caves, rockshelters and open-air sites are known in Epirus (Asprochaliko, Kastritsa, Klithi, Boila, Megalakkos, Kitsos, Thesprotia, Kokkinopilos), Boeotia (Seidi) and the Argolid (Franchthi, Klissoura, Kephalari, Berbati-Limnes), but are rare in the western Peloponnese, Thessaly (Theopetra), Macedonia and Thrace. Sites were generally small and used on a seasonal basis for hunting large herbivores, such as ibex and chamois. One of the better understood sites is Franchthi Cave in the Argolid (Perlès 1999). The large cave was occupied between ca. 30,000 and 11,000 BP with a major occupation hiatus between 17,000 and 13,000 BP. The early Upper Palaeolithic is characterised by a dry and cold climate. Located in a steppe landscape 7 km distant from the coast, the primary economic activity of the inhabitants suggested by archaeological and palaeoecological evidence was hunting large mammals, such as equids and deer that moved along the large coastal plains. As there is no evidence of any other subsistence activities, such as gathering of land snails, it appears that the cave functioned primarily as an occasional hunting camp. Following the onset of warmer and more humid climatic conditions, the cave was reoccupied in ca. 13,000 BP. Steppe vegetation had given way to a more diverse plant cover of Mediterranean shrubs, trees, wild cereals and wild legumes. In addition to equids and deer, the inhabitants now also hunted wild cattle and goat. Scholars regard the presence of sea shells, land snails, almond, pear, pistachio, wild cereals and legumes as indicating the use of the cave by entire families who are exploiting all environmental niches and using the cave as a permanent base camp. The existence of children's bones

Figure 3.4 Map of key Upper Palaeolithic findspots.

also points towards such inclusive use of the cave. Towards the end of this period, obsidian from the island of Melos makes its first appearance, offering concrete evidence of seafaring, way-finding and exploration skills (Perlès 1999). By now the sea would have moved much closer to the cave, reducing the productive lowland region to less than one-fifth of the cave's catchment area (van Andel and Shackleton 1982).

Evidence is currently limited for Upper Palaeolithic sites on islands, but Corfu (Grava), Lemnos (Ouriakos), Thasos (Lemenaria Tsines mines), Gavdos (off Crete) and possibly the Northern Sporades and Naxos reportedly have brought to light artefacts from this time period. As none of these sites have been published in detail, they can, at the moment, only provide tantalising glimpses of human behaviour at this time.

MESOLITHIC

Scholars disagree on a clear-cut timeframe for the Mesolithic period in Greece, and estimated date ranges vary by up to 1,000 years (Galanidou 2011). The reason for this lies in the fact that the Mesolithic is a culturally defined period whose onset may differ from region to region. For example, the earliest Neolithic level at Knossos on Crete is considered contemporary with the Mesolithic levels at Sidari on Corfu. For the purpose of this book, I consider the Mesolithic to begin around 11,000 cal BP and end around 8,000 cal BP. This period is characterised by the continued global warming that began in the Upper Palaeolithic. As a consequence of the melting ice-sheets, humans had to adapt to new and rapidly developing environmental conditions, such as the reduction of extensive coastal plains and the re-emergence of deciduous forests inland and the typical Mediterranean vegetation in the coastal zones (Bottema 2003; van Andel 2005: 381, 387). Sea levels are estimated to have risen from ca. −130 m in the Lower Palaeolithic to −30 m below current ones which marked the beginning of the 'becoming' of islands in Greece: islands that had previously been part of the mainland became separated and the single large Cycladean Island became fragmented into small independent islands that began to resemble the morphology of the modern Cyclades (Kapsimalis et al. 2009). It is estimated that this process was completed by ca. 6,000 BC when the islands reached their current configuration (van Andel 2005: 384). While the Palaeolithic was characterised by a steppe environment dominated by large herbivores, such as wild ass and bison, that travelled in large herds and fed on grasses on the large coastal plains, Mesolithic forests supported a more diverse number of species, with red deer and wild boar playing a particularly important role (van Andel 2005: 387). With the sea now more dominant, seafaring became a way of life and people began to exploit marine resources more extensively along the coasts and in the deeper seas.

With only 12 recorded sites, the Greek Mesolithic was virtually unknown in the 1980s (Cherry 1987: 705). By 2005 this number had increased to 16 known Mesolithic sites (van Andel 2005: 388). Of these, only a fraction had been excavated and published. The best known ones were Franchthi Cave in the Argolid and Sidari on Corfu. Sidari represents a 60 m long shell midden of foragers who specialised in collecting cockle shells on a seasonal basis (Sordinas 1969), while Franchthi Cave resembles a permanent multi-purpose base camp (Figure 3.5).

Following a brief hiatus at the end of the Palaeolithic, Franchthi Cave was reoccupied during the Mesolithic (ca. 9,500–8,000 BP). Due to the rising sea level and warming climate, the extensive costal flats were markedly reduced (the coast was now only 2 km away) and open oak forest, interspersed with Mediterranean shrubs and trees, covered the surrounding area (Hansen 1991; van Andel and Sutton 1987). The variety of seeds and food remains uncovered pays testimony to the different environmental niches that the inhabitants exploited – ranging from "hunting of red deer, pigs, small prey to fishing, and collecting nuts, landsnails, shellfish, fruits, legumes and [. . .] cereals" (Cullen 1995: 273), while the quantity hints at year-round occupation. Among these activities, it is fishing that has drawn particular scholarly attention. Fish bones increase to 20–40% of the entire bone assemblage, many of them representing large fish like tuna, and testify to entirely new economic strategies. In total, nine burials (6 inhumations and 2 cremations) have been found inside the cave as well as bone and tooth fragments

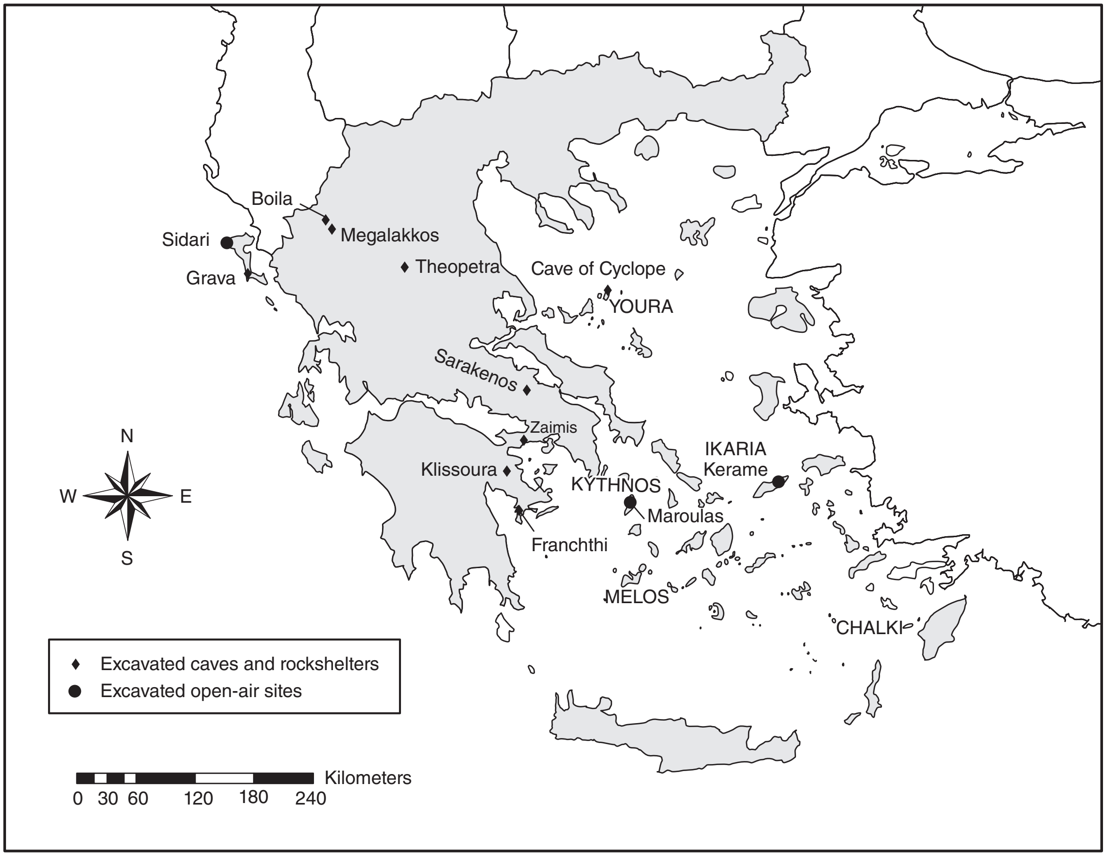


Figure 3.5 Map of key Mesolithic sites.

that may represent up to 25 humans (Cullen 1995). Following the first appearance of obsidian transported from the island of Melos in the 11th millennium BC, quantities of this raw material increased during the Mesolithic, although they still only account for a minute proportion of the total lithic material (Perlès 1987).

Other Mesolithic mainland sites include Theopetra Cave, Thessaly, with five hearths and one female burial (Kyparissi-Apostolika 2003), Sarakenos Cave in Boiotia, Grava on Corfu, Megalakkos and Boila in Epirus, Zaimis Cave in the Saronic Gulf, Ulbrich Cave in the Argolid as well as Klissoura Cave 1 and two possible open-air sites in the Berbati area in the Peloponnese (Runnels 1996: 27–33).

In 2003, researchers participating in a major conference on the Mesolithic period in Greece stated that a meaningful synthesis of site distribution patterns was premature at that time (Galanidou and Perlès 2003: 31). A decade of surveys and excavations later, our sample size remains small, but scholars appear to have reached an understanding that sites display a preference for being located along the sea shore in relatively close proximity to marshes, beaches, bays and streams which permit access to both fresh and sea water habitats as well as to forested hinterlands rich in game and plants (Runnels 2009:

61). Unfortunately, it is highly likely that many coastal sites have been lost to eustatic sea level rise or tectonic movement in this seismically active region. While inland sites exist, they are relatively infrequent. Initially, scholars contributed this lack of examples to the relative invisibility of Mesolithic sites which are normally small in size (often less than 15 m in diameter) and inconspicuous in their artefact types and quantities and may therefore have been missed by field survey (Runnels 2009: 58–59). However, targeted surveys of hitherto empty inland areas also failed to identify additional Mesolithic sites while they did reveal new Mesolithic sites in known occupied regions. Scholars thus agree that inland sites are generally less common (they occur in Epirus and the Argolid) and that some regions of Greece (e.g. eastern Thessaly, Messenia, central Macedonia) appear to have been uninhabited or not used extensively (Runnels 2009: 60; van Andel 2005: 390; Galanidou 2011: 235). The majority of sites appear to be seasonally occupied specialist food procurement sites. In contrast, the evidence of hut structures, burials and the small finds at Maroulas on Kythnos hints at a permanent residential base. Franchthi Cave in the Argolid combines both scenarios and is considered a residential site with seven special-purpose satellite sites for foraging, hunting or fishing activities at less than a day's walk (Runnels 2009: 69).

Until recently, no Mesolithic sites had been confirmed on the Greek islands. The lack of evidence originally allowed John Cherry to argue that "there was *no* indications of settlement on any Mediterranean island before the Neolithic, yet there existed a few hints of widespread early movements among the islands" and that true colonisation of islands only began with the Neolithic when imported domesticated plants and animals offered reliable food sources for permanent settlers (Cherry 1981: 48). However, excavations have begun to fill our knowledge gap, and we now have two well-published sites at Maroulas on Kythnos and the Cave of Cyclope on Youra. These recent discoveries have thoroughly undermined earlier arguments that "settlement of most islands is a relatively late phenomenon" (Cherry 1981: 58). Instead, we can now begin to appreciate Mesolithic people for what they were: accomplished travellers, pathfinders and raw material exploiters, capable of setting up home even in challenging environments.

Maroulas on Kythnos is an open-air site situated in the northeast of the island and dated to the 9th millennium BC (Sampson et al. 2010) (Figure 3.6). Although in a coastal position today, Mesolithic Maroulas would have been an inland site. Excavations have brought to light several small circular huts with stone floors that, based on the evidence of consecutive floor layers, seemed to have been in use for long periods of time. Unusually, the excavators found evidence of at least 25 burials – some underneath huts, others placed into cut graves or pits. No grave goods have come to light, but most of the skeletons seemed to have been decorated with red ochre and thus present evidence of some kind of burial ritual (Sampson et al. 2010). Occupants exploited all available environmental niches, although marine resources (both of migratory pelagic species, such as tuna, bonito and mackerel, as well as morays, eel and scorpion fish which can be found in inshore waters) appear to have been of prime importance. Interestingly, an analysis of fish preferences for each hut showed that each family consumed a different combination of fish species – whether we should interpret this as an expression of actual food preferences or rather as the result of different fishing techniques remains to be seen (Mylona 2010). This marine diet was supplemented by the hunting of migratory birds and forest animals (martens, fox, and hare),

a)

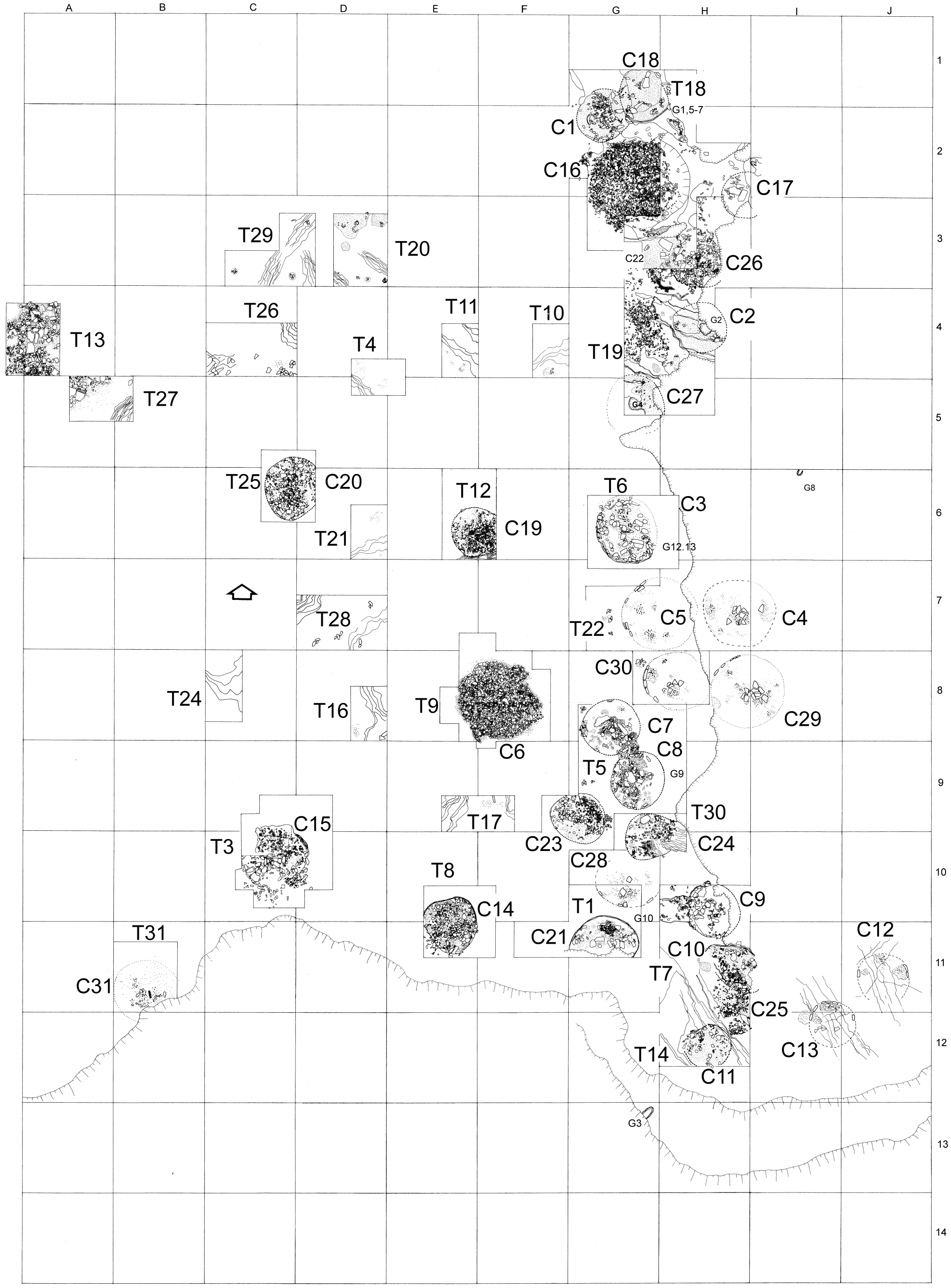


Figure 3.6 a) Ground plan of Maroulas on Kythnos (Sampson et al. 2010: Fig. 20). Image courtesy of A. Sampson.

b)

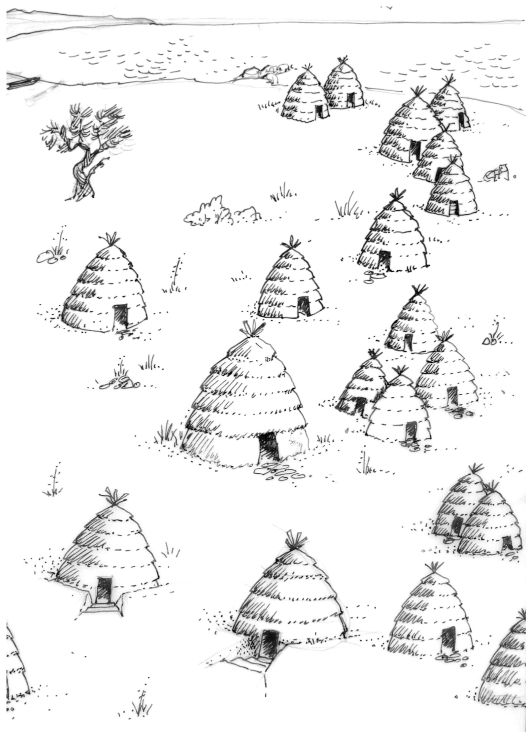


Figure 3.6 b) Hypothetical reconstruction of the settlement (Sampson et al. 2010: Fig. 91). Image courtesy of A. Sampson.

collecting of land snails, gathering of wild plants and exploitation of wild pigs (most likely brought to the island by Mesolithic people).

Maroulas also provides much evidence of an active and accomplished chipped stone industry that utilised both local (quartz) and imported raw materials (e.g. obsidian from Melos and white flint from the Greek mainland or Cyclades). In all three cases, the entire manufacturing sequence can be recognised on-site – from core to debitage to the finished artefact – and thus demonstrates the great skill of the local stone knappers as well as their ability to source diverse raw materials for their tools and weapons (Sampson et al. 2010).

Based on the evidence of solid hut structures, burials, grinding equipment for the processing of plant foods and seasonally available foodstuffs (migrating fish catches indicate occupation in spring and autumn while migrating bird species hint at occupation in spring and summer), the excavators are confident in their designation of this site as a permanent residence (Sampson et al. 2010).

The Cave of Cyclope is located in the southern part of the island of Youra (Figure 3.7). The island is part of a chain of islands and was separated from its nearest island neighbour by a deep sea channel. The limestone cave was mainly occupied during the 9th and 8th millennium BC (Sampson 2008a, 2011). The occupants primarily used the cave to support the intense exploitation of the shore and coastal sea as large quantities of excavated marine shells (approximately 55,000) and fish bones (approximately

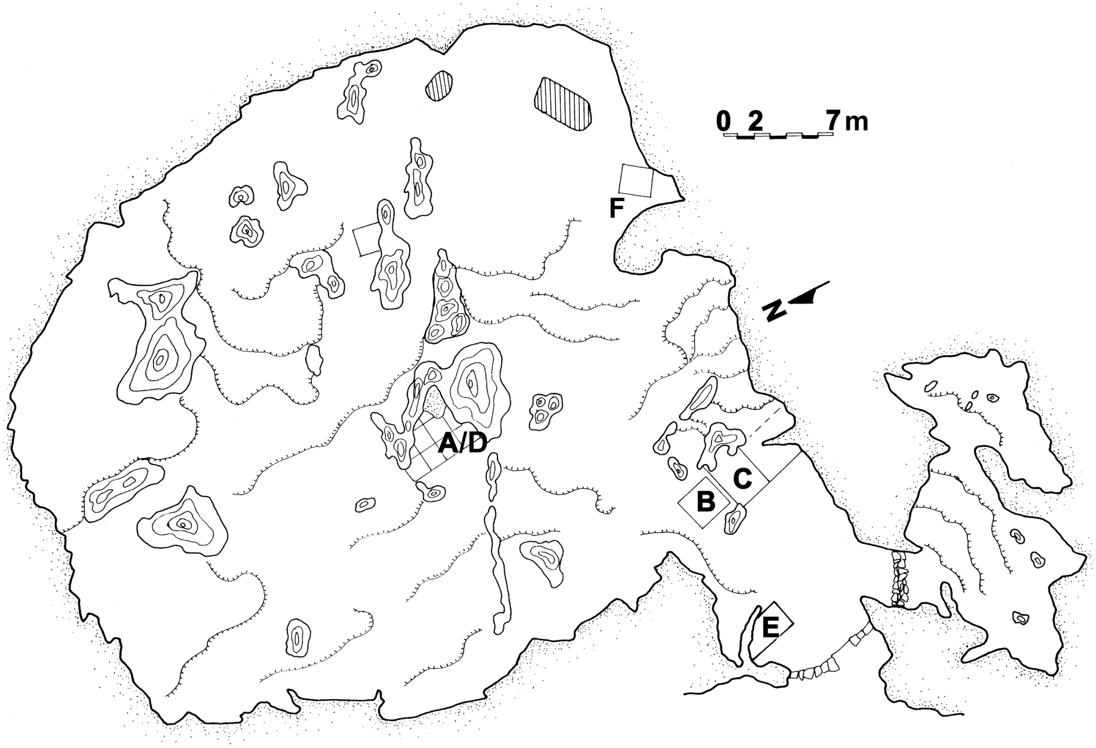


Figure 3.7 Plan of the Cave of Cyclope (Sampson 2008a: Fig. 1.4a). Image courtesy of INSTAP Academic Press.

9,000) indicate (Sampson 2011). The bulk of the fish caught lived in coastal waters, though a few pelagic fish, like mackerel and tuna, were caught when approaching the coast on their seasonal migrations. The exploitation of the sea was supplemented with targeted hunting of migratory birds and gathering of land snails; in contrast, deer were rare and seemed to have played no role in the islanders' diet. In addition to locally available but probably more seasonal food sources, the inhabitants also brought pigs to the island that provided a reliable source of meat. Over time, sheep or goat gradually replaced pigs in popularity. A variety of tools such as grinders, millstones and fishhooks offer concrete evidence of tools for food procurement and processing (Figure 3.8). Most tools were made of local rock, although eight were made of obsidian from the island of Melos in the Cyclades. The fact that the inhabitants had to cross a sea channel to reach the island, transported animals between islands, caught fish and utilised obsidian from a very distant source is a good indicator of their ability to explore and exploit new environments, including the sea itself. Despite the wide spectrum of available foodstuffs and the ingenuity of the occupants in bringing with them animals and tools not available locally, the excavator believes that the cave was probably only occupied on a seasonal basis for the purpose of catching fish and hunting birds, and the occupants returned to the larger island of Alonnessos for the remainder of the year (Sampson 2011).

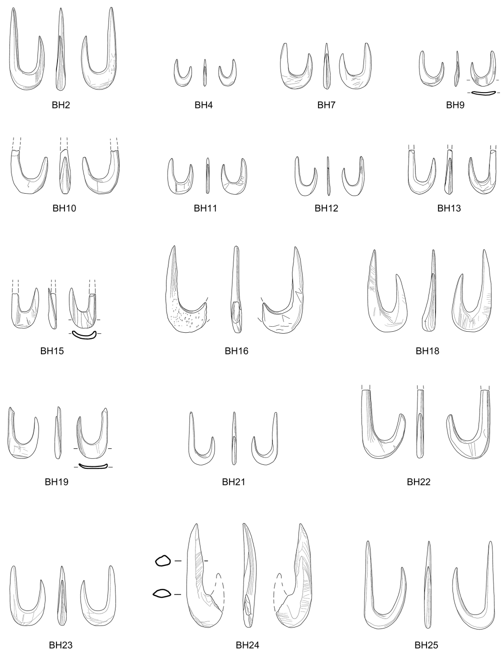


Figure 3.8 Fishhooks from the Cave of Cyclope (Sampson 2011: Fig. 1.5). Image courtesy of INSTAP Academic Press.

The search for Mesolithic sites on islands continues and Ikaria and Chalki in the Dodecanese, Roos on Naxos, and Crete provide the most recent evidence. The open-air site of Kerame 1 on Ikaria is dated to the first half of the 9th millennium BC. The excavator argues that the site was seasonally occupied for the purpose of fishing and hunting (Sampson et al. 2012). The lithic tradition shows great similarities with that of Maroulas on Kythnos. What appears, however, distinct from all other sites, is the utilisation of obsidian from more than one source. Visual inspection shows that Melos was the major source of obsidian, with Giali in the Dodecanese and possibly also Antiparos being minor sources (Sampson et al. 2012) (Figure 3.9). A large settlement area of Mesolithic date has been identified on Naxos. Obsidian from Melos and flint from Naxos were in use (Sampson 2016). On Crete, a survey by Strasser and his colleagues (2010) has uncovered 20 small Mesolithic stone assemblages outside caves and rockshelters that probably served as seasonal camps for the exploitation of coastal wetlands. No doubt, ever-increasing numbers of sites will come to our attention in the near future.

Seafaring

Scholars have been debating the seafaring abilities of Upper Palaeolithic and Mesolithic hunter-gatherers for decades. The presence of obsidian and bluefin tuna at sites was taken to imply the use of boats and an ability to exploit the sea and distant islands and thus act as a proxy measure for early

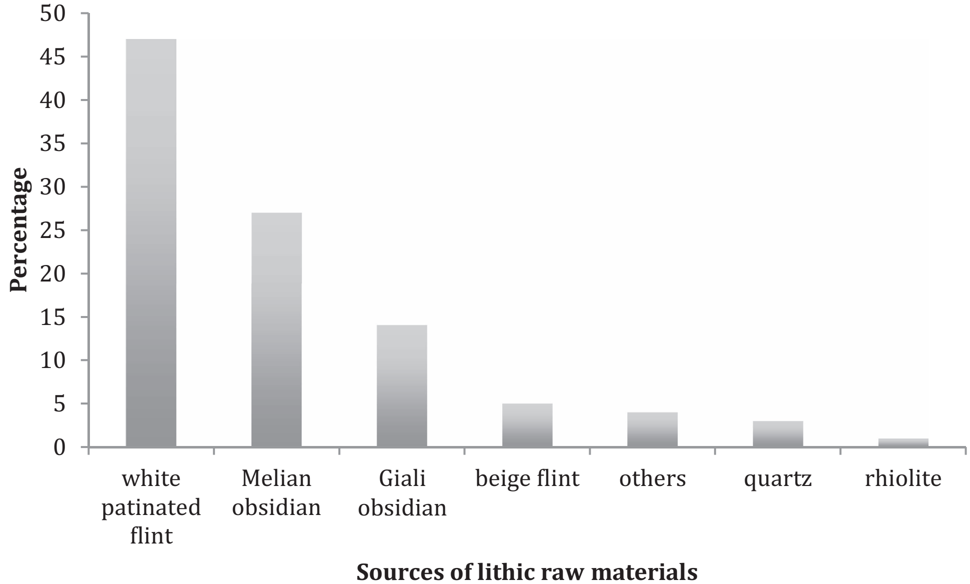


Figure 3.9 Sources of lithic raw materials at Kerame, Ikaria (after Sampson et al. 2012: Fig. 13).

seafaring abilities. Depending on whether scholars postulated direct journeys across the open sea or indirect ones via stepping-stone islands, seafaring abilities are either considered sophisticated – requiring extensive navigational skills and seaworthy boats – or basic – requiring short crossings of approximately 20 km to clearly visible targets using primitive log, hide or straw boats.

The advantage of obsidian as a proxy for sea journeys is that this volcanic glass is only found in discrete locations. In Greece, it is available in larger amounts only on two islands: Melos in the Cyclades and Giali in the Dodecanese. Thanks to their distinct visual characteristics and discrete chemical signature, obsidian sources can confidently be identified macroscopically and scientifically. In Greece, scientific methods have identified Melos as the origin of all early dated finds (Laskaris et al. 2011; Renfrew et al. 1965). As Melos has been a true island for much of its life, separated by at least 10 km from its nearest neighbour, the presence of obsidian finds at the other mainland or island sites confirms the ability of travellers to travel the sea with the intent and purpose to procure this raw material from the 11th millennium BC onwards; they were able to build boats, explore distant places and learn about their resources, cross the sea and undertake successful return journeys (Cherry 1981: 45).

The earliest examples are 12 pieces of Melian obsidian (approximately 1% of the total lithic assemblage) from Upper Palaeolithic layers at Franchthi Cave, dated to 11th millennium cal BC (Perlès 1987: 142–145). Obsidian finds increase moderately in the Mesolithic period, rising to approximately 3% of the total lithic material (Perlès 1990: 48). Much larger quantities of obsidian artefacts and cores are attested in Mesolithic layers at Maroulas on Kythnos where they make up about 31% of the total lithic assemblage (mid 9th millennium BC) (Sampson et al. 2010: 42–61). Eight obsidian pieces have been found at the Cave of Cyclope on Youra (second half of 8th millennium cal BC) (Kaczanowska

and Kozlowski 2008: 169–172). Large quantities of obsidian (approximately 1,500 pieces or 40% of the lithic assemblage) have been reported from Ikaria in the Dodecanese where excavators are hinting at the possibility of multiple sources (Sampson et al. 2012). Recent reported finds of obsidian also at other sites in Attica and the Cyclades may well speak to an even greater utilisation of obsidian during the Upper Palaeolithic–Mesolithic than previously acknowledged (Laskaris et al. 2011: 2477). Interestingly, despite the prominence of Melos as an obsidian source, we do not have any confirmed evidence as yet of Palaeolithic or Mesolithic remains on Melos itself, which indicates open and unrestricted access to this valuable resource. Whether the raw material was procured directly by each community and represents the outcome of targeted or serendipitous long-distance ventures, or whether obsidian reached its final destinations through indirect down-the-line exchanges via intermediate communities is impossible to determine, though the presence of cores in assemblages speaks more strongly to direct procurement.

The exploitation of bluefin tuna, a pelagic species that inhabits the open sea, is often considered alongside the appearance of obsidian as an indicator of early seafaring activity because both of them are often found in the same chronological layers. Evidence of tuna fishing comes from Franchthi, Maroulas and Cave of Cyclope. The inhabitants of Franchthi had been exploiting fish since the Lower Palaeolithic. Initially, they did not venture far from the coast from which they harvested easily accessible shellfish and inshore fish. During the Mesolithic, however, fishing expanded to include barracuda and tuna – both species that inhabit the deep sea. By the late Mesolithic, tuna is dominating (Rose 1994; Stiner and Munro 2011). In fact, Payne estimated that tuna made up 50% of the entire animal bone assemblage (1975, 1982). Originally Payne considered this pattern to be evidence of specialised deep-water tuna fishery (1975b). However, a comprehensive analysis of tuna bones by Rose (1995) established that the role of tuna fishing had been overstated: the number of individuals present in the assemblage is actually quite small – especially when considering that the sequence spans several centuries. The individuals caught were mature, but relatively small in size. Exceptionally large specimens of 200 kg are rare. More importantly, Rose argued that tuna, although classified as pelagic fish, actually approaches the coast on annual migrations and could have been caught near the cave, not in the open seas. An earlier suggestion by the excavators (Jameson, Runnels and van Andel 1994) that tuna were caught at distant fishing grounds with favourable upwellings and transported to the cave is unlikely given the perishable nature of the catch and the slow speed of travel (Rose 1995). The current state of knowledge unfortunately does not allow us to determine whether fishermen were fishing for tuna from the shore, from boats near the coast or from boats in the open sea. Be this as it may, scholars emphasise that the equipment and effort required to catch these large fish would have been significant (Stiner and Munro 2011: 633).

The economies of Mesolithic Maroulas and Cave of Cyclope were also focused on marine resources. The inhabitants of Maroulas had a preference for migrating fish, such as tuna, bonito and mackerel, but did not ignore fish available inshore. While numerous in quantities, the tuna specimens caught were only small to medium in size. No fishing equipment has been excavated and as such it is difficult to establish whether tuna was caught when approaching the coast during its annual migrations or on the open sea from a boat (Sampson et al. 2010). At Cyclope, we can see a reliance on both marine molluscs and fish. The 29 fish species and the collection of fishhooks signal a strong preference for inshore

fishing (Figure 3.8). Remains of migrating fish species, such as tuna, are comparatively rare (Sampson 2008a, 2011).

While all scholars postulate the existence of seaworthy watercraft, no physical remains or depictions exist. Based on modern anthropological parallels, contemporary archaeological finds from northern Europe and Africa, Neolithic boat models from Greece and experimental voyages, scholars have speculated that Mesolithic boats were made from perishable organic materials such as wood, hide or reeds (Bednarik 1999; Marangou 2001a, 2001b; Tzalas 1989). These early crafts would have been propelled and steered by muscle power (oars, paddles or poles), could only carry a limited cargo and required calm weather and a flat sea. Travellers had to wait out windy or choppy conditions before proceeding. Due to these limitations, their cargo capacity, travel speed and journey range would have been considerably less than those postulated for sailing boats that made their first appearance in Greece at the beginning of the Middle Bronze Age (ca. 2,000 BC).

To test the suitability of such crafts, the archaeologist Harry Tzalas and a group of students built a replica reed boat based on a traditional design known from Corfu (1995). Propelled by a crew of six with paddles, the '*papyrella*' travelled from Lavrion on the Greek mainland to the obsidian island of Melos using intermediate islands as stopover points (Figure 3.10). The crew achieved an average speed of 1.65 nautical miles per hour and paddled a total distance of 72.5 nautical miles in 8 days. The longest individual crossing was 14 nautical miles. However, adverse weather forced the raft to seek shelter for another 8 days en route (Tzalas 1995). This experimental obsidian procurement voyage demonstrates the relative ease – as well as a considerable time investment – with which these journeys could have been undertaken. With crossings short and the next island destination always clearly visible, raw materials for the building of a craft and a group of strong paddlers were all that was required to explore the islands.

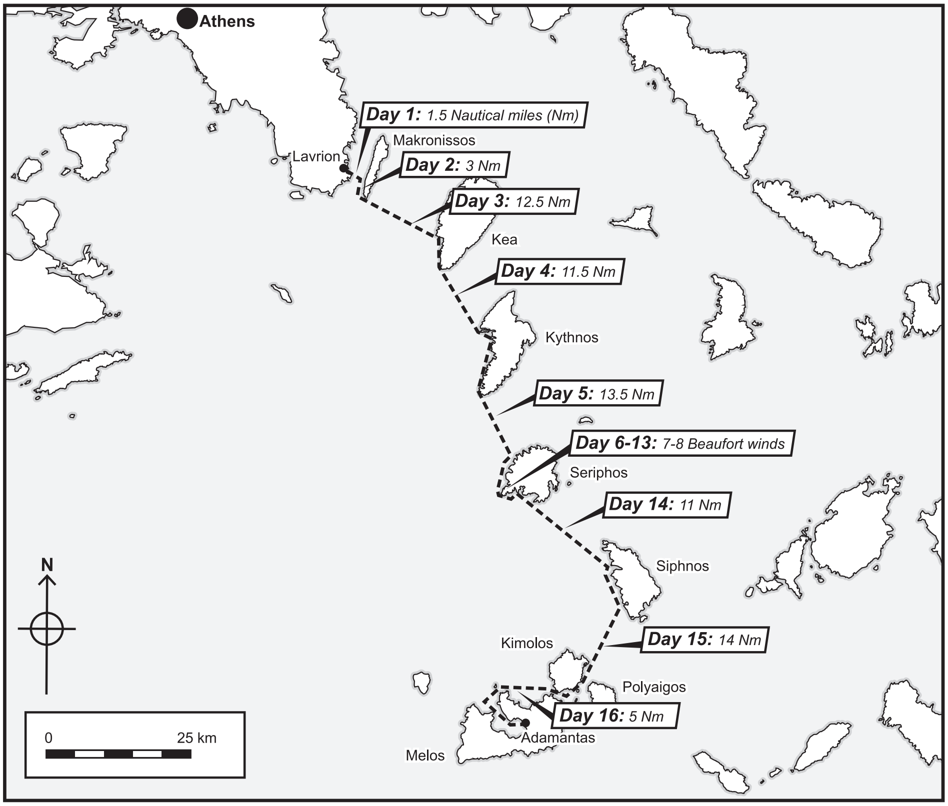
As fishing seems to predate the obsidian evidence at both Franchthi and Youra, scholars have argued that boat-building and navigation skills were originally developed as part of seasonal food procurement strategies. Once available, these skills were then utilised in the exploration and exploitation of more distant regions and their raw materials (Powell 2003: 82; Broodbank 2006: 210, 217).

CONTEXTUALISATION: ISLAND COLONISATION

As we have seen, the Palaeolithic and Mesolithic were periods of great mobility with hominins moving around the land, islands and across the sea to explore near and distant places, exploit seasonally available resources and bring back desirable raw materials. Most of these visits and explorations would likely have been short term, seasonal and left little or no trace behind. Archaeologists are thus entirely clueless about these initial, serendipitous or exploratory encounters, their purpose and frequency. It is often only with colonisation (i.e. the establishment of a permanent settlement) or frequent repeated visits to seasonal special-purpose sites which leave long-term material traces behind that archaeologists are able to detect accumulated evidence of habitation or use.

Acknowledging that humans interact with islands in both ephemeral and permanent ways, Dawson (2004–2006) provides a helpful scheme for conceptualising human encounters with the island

a)



b)

Figure 3.10 a) The route taken by the experimental papyrella boat (after Tzala 1995: Fig. 2). b) Paddling the papyrella (Tzalas 1995: Fig. 9b). Image courtesy of H. Tzalas.

environments. Her model takes into account a wide range of interactions, ranging from initial discovery to abandonment and resettlement. According to her scheme, initial discovery is followed by visitation and utilisation. Utilisation most frequently refers to sought-after raw materials with limited geographic distribution, such as obsidian or metals (in later periods), but may also include fishing grounds, migrating birds, wild animals and plants. Social reasons for utilisation may relate to an island's use as a burial ground (the Italian island of Vulcano during the Bronze Age) or as a maritime sanctuary (the island of Keros in the Early Bronze Age). Occupation and establishment follow utilisation. Occupation refers to the initial phase of the colonising process when inhabitants set up permanent habitation. Dawson defines this as "a physical and mental appropriation of space where humans carry out activities that allow them to set themselves up in a geographical area and possibly lay claims over it" (2004–2006: 37). Establishment is when the settlement has become a permanent, long-term feature of the island. Abandonment often follows before resettlement may take place, as in the case of the island of Kythnos that, after initial occupation in the 8th millennium BC, was uninhabited for five millennia before being resettled in the 3rd millennium BC (Dawson 2010: 205).

This idealised version is presented as a linear temporal sequence; in reality, however, the process may be interrupted at any stage, jump individual stages, or repeat various stages. Likewise, the length of individual phases or the length of time intervals between phases is not predetermined and will vary from case to case, such as the utilisation of obsidian sources on the island of Melos in the 11th millennium cal BC that did not result in the creating of a permanent settlement on the island until the 4th millennium BC.

Colonising parameters

It is difficult to overestimate the obstacles humans face when entering a new environment and wish to develop familiarity with its resources, challenges and limitations. Rockman (2003) has identified three different types of knowledge as essential prerequisites for becoming familiar with a new place: locational, limitational and social. Locational knowledge relates to "spatial and physical characteristics" (Rockman 2003: 4), such as the exact location of an obsidian outcrop, the migration routes of mammals or the location of springs. This kind of information is relatively easy to acquire over a short span of time. Limitational knowledge provides a judgement of the usefulness and reliability of the identified resources: how useful is the obsidian outcrop for making tools? When do mammals migrate? Are the springs perennial or seasonal? As limitational knowledge requires an understanding of periodicity, it can only be acquired by long-term observation and use; Rockman suggests one generation as a suitable time frame. Social knowledge is the most complex to acquire. It refers to our social experience of the environment and may be transmitted through stories, myths and rituals. Based on anthropological research, Rockman considers 100 years to be the minimum time frame for these cultural interactions to manifest themselves. Applying this scheme to the Aegean Islands, evidence of exploitation of targeted resources (e.g. obsidian, migrating birds, fish) firmly hints at the existence of both locational and limitational knowledge many centuries or even millennia prior to the actual colonisation of islands. Social knowledge is more difficult to identify in the archaeological record, but the accumulation of the vast shell midden on Corfu or the human burials at Maroulas are tentative indicators of social patterning of a landscape.

Initial discovery and exploration of an island is often followed by colonisation. Conventionally, scholars investigate island colonisation in relation to social and environmental aspects in order to disentangle the underlying motivations for and against locational choices of settlement. Social aspects are conceptualised in terms of “push” and “pull” factors. Push factors are those aspects of the current location that make it less attractive to the coloniser than their potential future home, such as dwindling food supplies, a diminishing range of resources, little cultural freedom, or few work opportunities. In contrast, pull factors represent the knowledge about the new location that makes a migration viable, such as knowledge of transport to it and specific knowledge about living conditions in the new homeland (Anthony 1997). Push and pull factors always work in tandem, and are inherently social in nature as migrants often follow existing social networks (through which they gained intimate knowledge of the location) rather than selecting their destination on the basis of economic reasons (but often only indirect knowledge).

Environmental aspects of island colonisation can be summarised under the heading of ‘island biogeography’ (see also Chapter 2). The genesis of this term goes back to MacArthur and Wilson’s seminal book *The Theory of Island Biogeography* (1967), which investigates the factors involved in the colonisation and subsequent evolutionary development of animal and plant species on islands. In particular, they predicted that number of animal species on an island, island size and distance from the mainland were correlated in predictable ways: larger islands can support a great diversity of species and greater numbers of individuals; the greater the distance of the island to the mainland or stepping-stone islands, the lower the species ratio and number of individuals. On the basis that humans are, ultimately, also animals and are thus subject to similar constraints as other living organisms when establishing themselves on an island, scholars began to draw on island biogeography as a framework for elucidating general patterns of human island colonisation. Keegan and Diamond (1987), for example, argued that nearby islands were colonised before distant ones as access was easy, and that big islands were inhabited before small islands as they offered more area, diverse environmental niches and resources. While the authors acknowledged that exceptions exist, they believed the general pattern held true, and the Aegean islands furnished an eloquent case study of the presumed veracity of biogeographical principles. Based on the colonisation data available at the time, Cherry (1981, 1990) analysed colonising patterns which demonstrated the applicability of these rules to the Aegean: the first islands to be colonised were the two largest islands in the eastern Mediterranean, Crete and Cyprus (earliest Neolithic). Settlement then spread to large islands of at least 100 sq km in area and located close to the mainland (Lefkas, Samos, Thasos, Kos, Chios, Rhodes, Lemnos, Kalymnos, Kea, Aegina) (final Neolithic). The bulk of islands, generally rather small and located at some distance from the mainland, were only permanently occupied much later (Early Bronze Age). Cherry believed that the latter islands generally were too small to offer suitable sites for mobile Mesolithic hunter-gatherers. Settlement only became possible with the appearance of domesticated animals and plants in the Neolithic that offered reliable food supplies. Initially, however, colonisation was limited to the largest islands that provided the most fertile agricultural regions. It is only with agricultural improvements, such as the introduction of the plough, that negated the effects of island smallness or remoteness and allowed farmers to exploit more marginal lands, that smaller and more distant islands experienced a major colonisation drive in the Early Bronze Age (Cherry 1981: 59).

Based on the most recent archaeological data available, Dawson (2014) has prepared an update that supports the general pattern originally observed by Cherry, namely that islands were colonised gradually: initially slowly, and more rapidly from the Neolithic onwards. Earliest occupation is evidenced on Crete and Cyprus, the two largest islands in the eastern Mediterranean. Ikaria and Chalki in the south-eastern Aegean follow in the 9th millennium BC. The earliest settlement on Youra and Kythnos is dated to the 8th millennium BC. Colonisation of islands during the Neolithic is all-pervasive and there seems to be no pattern with regard to distance or area size. In contrast to Cherry, who considered the Early Bronze Age the main period of island colonisation, Dawson has conclusively shown that it is actually during the Neolithic that most islands were permanently inhabited (Figure 3.11). In the end, it seems that the contribution of biogeography to understanding human behaviour is less useful than originally thought. While the tenets of island size apply somewhat during the early Mesolithic (hunter-gatherers require a greater area for their foraging activities than agriculturalists for growing crops), they were also the farthest islands. No clear-cut correlation is visible in the later Mesolithic or subsequent periods (Dawson 2014: Figs. 6.4 and 6.6). This is not to say that environmental variables do not impact on human behaviour; it merely shows that humans can develop strategies to overcome environmental obstacles and limitations.

Without discernible patterns in the colonisation of Greek islands, understanding the motivations behind this behaviour remains a challenge. The utilisation of raw materials, plants and animals provides fairly obvious clues for the reasons behind the location of seasonal camps and resource exploitation visits to the Aegean Islands. Less clear are the reasons underlying the establishment of actual settlements,

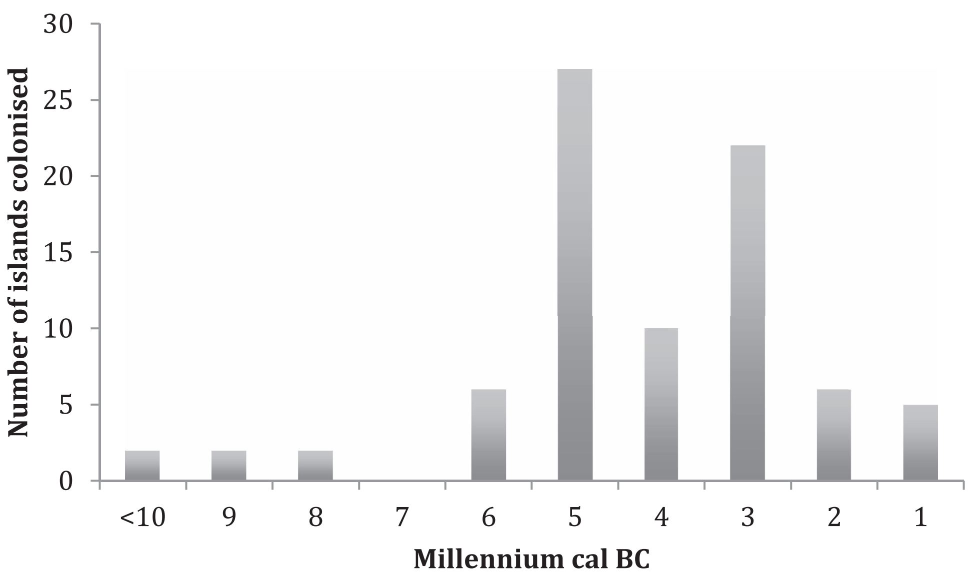


Figure 3.11 Colonisation pattern of the eastern Mediterranean islands (after Dawson 2014: Fig. 6.2).

though they too are likely to relate to the procurement of foodstuffs. During the Palaeolithic, for example, we can observe an apparent preference for caves and rockshelters with easy access to migration routes of large herbivores. In the Mesolithic, however, hunter-gatherers favoured marshy or coastal areas which were ideal locations for the gathering of snails and molluscs and catching of fish. In addition, the forested hinterland ensured ready access to smaller game.

Whatever the underlying motivations, one point is clear: visitation, exploitation and subsequent colonisation were targeted and intentional events by individuals or groups familiar with navigating the Aegean Sea, knowledgeable about the islands and their resources.

4

SETTLING THE AEGEAN ISLANDS

The Neolithic

The beginning of the Neolithic period in Greece is associated with the first appearance of domesticated animals and cultivated plants. This transition was conventionally dated to ca. 7,000 BC (Perlès 2001), but a reassessment of the radiocarbon dates upon which this assumption is based is now suggesting a date closer to ca. 6,500 cal BC (Reingruber and Thissen 2009). Settlements did not emerge at the same time all across Greece, however. Based upon 241 radiocarbon dates, the oldest sites are found on Crete, followed by those in Thessaly, northern Greece, the Argolid and eventually the southern Aegean islands towards the end of the Neolithic period (Figure 4.1).

The beginning of agriculture is of great importance not only because it signals a change in subsistence practices from hunting and gathering to more sedentary agriculture, but because these practical changes must have altered relationships between individuals, groups and communities, as well as their relationship with nature (animals, plants, landscape). Discussions of the earliest agriculture in Greece revolve invariably around the content of the so-called Neolithic package, a selection of key domesticates and cultivars. Traditionally, the 'founder crops' of domesticated emmer, einkorn, hulled barley, flax, lentil, pea, bitter vetch, and chickpea together with domesticated goat and sheep, pig and cattle are considered to have spread rapidly from southwest Asia to other regions after the 10th millennium BC. They reached Greece around 6,500 BC. However these 'founder crops' and animal compositions vary greatly in the first agricultural settlements in Greece in terms of the types of crops and animals present and their relative proportions. For example, Early Neolithic mainland sites show a preference for einkorn or emmer over bread wheat, while island sites show much greater proportions of sheep and/or goat when compared to mainland settings (Perlès 2001: Table 8.1). This diversity demonstrates that the adoption of crops and animals was not a wholesale implementation of one standard set of new practices at a single point in time, but the result of continuous trial and error over many years that took account of idiosyncracies of the social context, local economies and environment. Matters get ever more complex

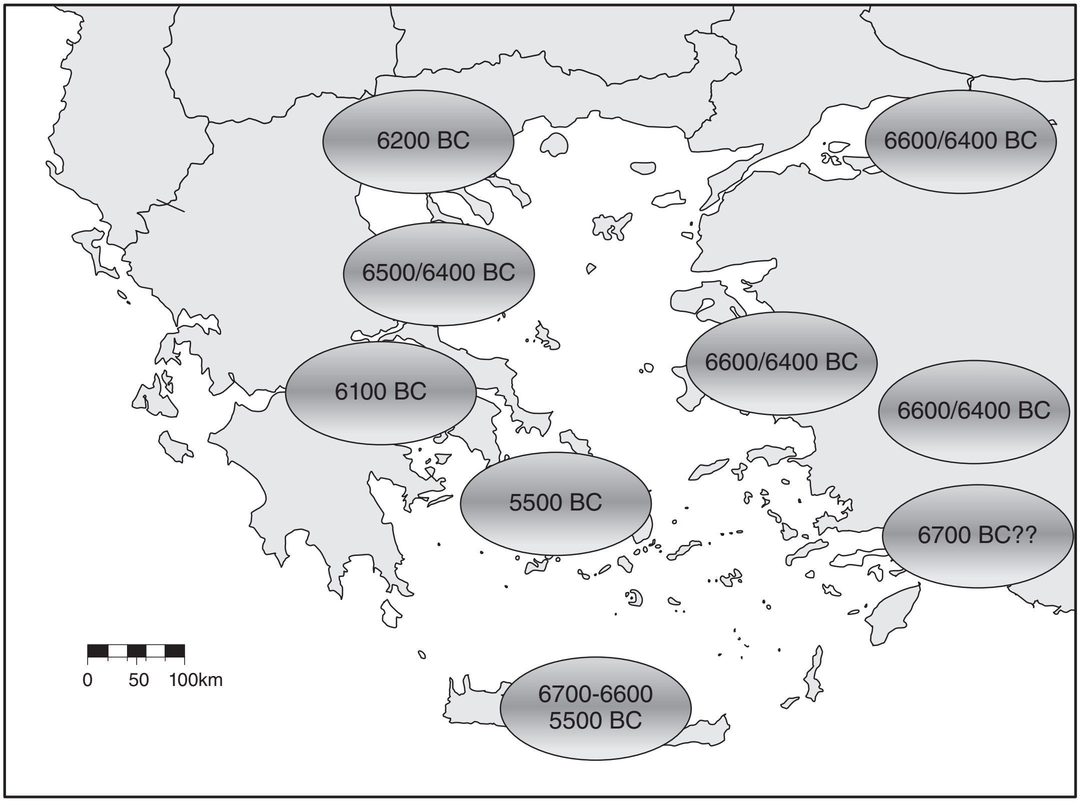


Figure 4.1 First appearance of Neolithic sites in the Aegean (after Reingruber 2011: Fig. 9).

when scholars expand the 'Neolithic package' to include material culture items, such as figurines, pottery, ground stone implements and spindle whorls (Perlès 2005). Given the inconsistencies in the use of the concept as well as the temporal and regional variability, Reingruber has rightly questioned whether the concept of a 'Neolithic package' is more a convenient concept for archaeologists than a reflection of real historical processes and as such should be abandoned in favour of a more nuanced, site-based analysis of Neolithisation (Reingruber 2011: 294–296).

What is even less certain is whether this new lifestyle was the consequence of a spread of an idea or of an actual movement of people. If it was the idea that spread, then indigenous Mesolithic hunter-gatherers developed these new agricultural practices gradually through knowledge exchange and experimentation. In contrast, if migrant farmers from Anatolia or the Near East introduced sedentary agriculture to Greece, then we must postulate a movement by people who brought their lifestyle with them and, most likely, intermarried with the local hunter-gatherer population (Özdoğan 2005; Efstratiou 2005). If one assumes a migration scenario, the lack of Early Neolithic sites in northern Greece makes an initial southerly coastal or island-hopping route from southern Turkey to Greece more likely than land-based travel via northern Greece (Broodbank 2006: 214–217). The existence of the very oldest

Neolithic layers on the island of Crete (Knossos) provides additional circumstantial evidence for this hypothesis. Analysis of early farming crops, however, is unable to discriminate between the idea transfer and human migration scenarios and the debate remains at an impasse. At the moment, scholars are in tentative agreement that the picture may have been rather complex and may have included a combination of population diffusion and cultural diffusion (Colledge et al. 2004).

ACERAMIC NEOLITHIC

Knossos on Crete is traditionally considered to be among the very earliest Neolithic settlements in Greece. The Aceramic layer (Stratum X) was located directly above bedrock in a trench sunk into the centre of the courtyard of the Late Bronze Age palace (Figure 4.2) (Evans et al. 1964, Evans 1971, 1994; also Efstratiou et al. 2004 for the recent excavations). Stratum X is characterised by the absence of pottery (hence the name 'aceramic'). Originally dated to around 7,000 BC, Reingruber and Thissen's reassessment of the radiocarbon samples (2009) proposes a date of 6,500 BC. Evans, the excavator, estimated that the site had been no larger than 0.25 ha and only supported a few families. No permanent structures have been recognised and it is likely that this was only a temporary camp site during this phase. The inhabitants practised mixed farming. Excavations revealed fully domesticated faunal and floral remains, such as bread wheat, barley, einkorn, emmer, lentil, cattle, pig and sheep. Figs and almonds are likely to have been wild. Finds included a few stone axes, beads of shell and some obsidian. Seven skeletons of children were found in this stratum; one of the children was placed in an oval rock-cut pit later sealed with an oval stone.

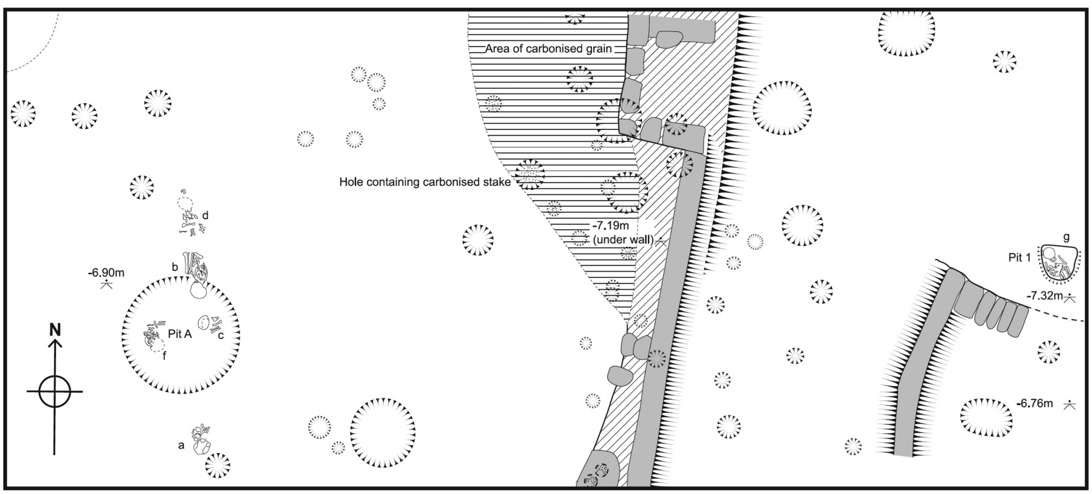


Figure 4.2 The Aceramic Neolithic (Stratum X) at Knossos (after Evans et al. 1964: Fig. 7). Image reproduced with permission of the British School at Athens.

As there are no prototypes of the domesticated plants on Crete and there is no evidence of experimentation or selective adoption, scholars concluded that the Neolithic package must have been transported wholesale to the island by the first settlers. Supporting evidence comes from species types and relative species proportions of the Knossian package, which closely mirrors those known from Anatolia and the Greek mainland (Broodbank and Strasser 1991). Broodbank and Strasser argued that the presence of wheat within the package makes an Anatolian origin of these settlers more likely as wheat was absent from other early Greek sites (Reingruber 2011). To keep sea journeys short, colonisation probably occurred via intermediate stepping-stone islands, such as Antikythera (30 km to Crete) or Kasos (50 km). Two possible explanatory models for the spread of this early agriculture were proposed: 1) a gradual spread of farmers throughout the Aegean islands who finally reached Crete as a geographic end point, or 2) a targeted colonisation of Crete that prioritised landscapes with large fertile plains, favourable climate and diverse fauna and flora. Given the lack of contemporary sites in the Cyclades and the fully developed Neolithic package, the authors argued for an intentional venture. They estimated that 40 colonisers would have to bring with them 10–20 pigs, 10–20 sheep or goats and 10–20 cattle as well as c. 250 kg grain per human to ensure a year's food supply and sufficient seed crops. They would therefore have to transport 15,450–18,900 kg in total – a journey not to be undertaken lightly or poorly prepared, and certainly not without prior knowledge of the final destination (Broodbank and Strasser 1991).

A strong word of caution must be inserted here about the preceding models, however. Until just a few years ago archaeologists were unaware of the existence of a Mesolithic period on Crete, and the settlement at Knossos was therefore considered evidence of the first settlers arriving on Crete. The new Mesolithic finds (see previous chapter) now open up the possibility of alternative interpretations of the Mesolithic–Neolithic transition, such as local experimentation with plants prior to the Neolithic, an influx of settlers over a more drawn-out time span, or multiple origins of settlers. No evidence for or against these alternative scenarios currently exists, but future surveys and excavations will in due time shed more light on this important period.

EARLY NEOLITHIC

Perlès published her important foundational work on the Early Neolithic period in Greece in 2001. Since then our knowledge of the islands has been further expanded through excavations and investigations. Dated to c. 6,500–5,800 BC, Early Neolithic settlements in Greece are located near large coastal agricultural lowland plains which provided the most favourable conditions for growing grain crops. Given the mountainous profile of the Greek landscape, the distribution of Early Neolithic sites is physically restricted to the north and east-central regions of mainland Greece, as well as Crete, where such large fertile plains can be found (Figure 4.3). Sites in the northwest and southern mainland, and the Aegean islands are rare, though recent research seems to be uncovering ever more. As regards the islands, we are now aware of Early Neolithic sites on Kyra Panagia (Ayios Petros), Youra (Cave of Cyclope), Chios (Ayio Gala),

Figure 4.3 Map of Early and Middle Neolithic sites in Greece.

Imbros (Uğurlu) and Skyros (Papa to Choma) (Efstratiou 1985; Sampson 2008b: 505). No Early Neolithic settlement has so far been recognised in the Cyclades, but Sampson argues that surface finds from Naxos and Siphnos may hint at the existence of occupation also during this period (Sampson 2008b: 505).

Relatively little is known about Early Neolithic settlements as not much physical evidence of structures has survived. From current evidence it appears that there is some degree of continuity from the Mesolithic period: settlements are located in regions that had a prior Mesolithic presence (e.g. Crete, Thessaly), burial customs are similar to Mesolithic ones, and microliths continue in use

albeit produced by new techniques (Reingruber 2011). In contrast are the new lifeways linked to new agricultural practices. Domesticated cereals and pulses were the main subsistence crops, while domesticated sheep/goat, pig and cattle were the most common animal species. Pottery was produced locally using local materials. A detailed analysis of the Franchthi Cave assemblage demonstrates that pots were still quite rare and were not yet used for domestic, utilitarian purposes such as cooking or food processing but were prized seed-storage containers (Vitelli 1989). In contrast to local pottery, exotic lithics (e.g. obsidian, flint, jasper) were imported as finished products or part-worked. These can be distinguished from the locally sourced lithics by greater knapping skills, and are considered the products of specialist itinerant knappers who travelled through Greece (Perlès and Vitelli 1999).

MIDDLE NEOLITHIC

The Middle Neolithic period is dated to ca. 5,800–5,300 BC. Sites are known from the Greek mainland, Euboia, the Northern Sporades, Ionian Islands, Thasos, Chios and the Dodecanese (Davis 1992; Papadopoulos and Malamidou 2008; Sampson 1984; Souyoudzoglou-Haywood 1999) (Figure 4.3). Despite intensive fieldwork, no Middle Neolithic settlements have as yet been discovered in the Cyclades.

The most detailed excavation is that of Ayios Petros islet off Kyra Panagia island (Efstratiou 1985). Kyra Panagia, together with the islands of Alonnisos, Skiathos, Skopelos and Youra, forms part of the Northern Sporades, a string of islands reaching out eastwards from the Thessalian mainland into the Aegean Sea. Radiocarbon dates reveal continuous occupation of Ayios Petros for approximately 2,000 years between 5,700/5,500 BC and 3,800 BC. People lived in mudbrick structures fashioned on top of rectangular or curving stone foundations. Its material culture, in particular the pattern painted pottery on a creamy background, exhibits close parallels with finds from the Cave of Cyclope on Youra – allowing scholars to argue for a 'Youra-Ayios Petros culture'. Nevertheless, stylistic affinities with mainland sites (e.g. bowls, open bowls and straight-sided bowls) indicate that the islanders were in regular contact with Thessalian communities. Finds include a noteworthy collection of 50 human and animal clay figurines, locally made stone axes and chisels, beads and pendants, worked shell and spindle whorls. Flint appears to have been imported from Thessaly, while obsidian came from Melos; the lack of worked cores hints at the import of finished or at least semi-completed objects. Bones of domesticated animals (especially sheep and pig) and the presence of stone querns, pestles and grinders indicates that the site was most likely a permanent settlement. The lack of fishing equipment and fish bones (beyond a few large tunny vertebrae) is puzzling given the settlement's proximity to the sea (Efstratiou 1985).

As in the Early Neolithic, lithic artefacts of obsidian and flint were often imported part or fully worked. Local stone was used primarily for rough axes or chisels or grinding implements. Given the difference in skill between imported and locally processed stone objects, it seems logical to concur with Perlès and Vitelli (1999) that itinerant traders or knappers supplied finished artefacts to the

settlements. In contrast it seems that pottery production took place predominantly locally even though skills, knowledge and stylistic features were often shared across large areas. Most of the vessels were finely crafted, often with elaborate decoration, and would have required considerable skill to make. For the first time we now see the appearance of cooking pots and storage jars, although their production output remains moderate – Vitelli (1989) estimates that only 100 pots were made per year at Franchthi Cave.

LATE AND FINAL NEOLITHIC

The later part of the Neolithic is roughly dated to 5,300–3,200 BC. Scholars have divided this period into two sub-phases, the Late and Final Neolithic. During these periods the vast majority of the Aegean islands were settled permanently for the first time. Based on a recent review of the literature, Dawson (2014) reports that 27 islands were inhabited in the 5th millennium BC and a further 12 were occupied in the 4th millennium BC (Figure 3.11). The Late Neolithic is represented by the Saliagos culture (ca. 5,300–4,200 BC). The Attica-Kephala culture is a hallmark of the Final Neolithic (ca. 4,200–3,200 BC) (Figure 4.4).

SALIAGOS CULTURE

The first permanent settlements in the southern Aegean islands are dated to the Late Neolithic and belong to the so-called Saliagos culture which has been radiocarbon dated to between 5,300 and 4,200 BC.

Cyclades	Samos	Chios	Rhodes	Lemnos	Crete
				Poliochni I	EM I
		Emborio VI–VII			
Kephala	Tigani III		Kalythies III		
		Emborio VIII			Knossos I
	Tigani II				Knossos II
	Tigani I		Kalythies II		
		Emborio IX–X			Knossos III
Saliagos					Knossos IV
			Kalythies I		Knossos V
					Knossos VI
					Knossos VII

Figure 4.4 Comparative chronology of the Neolithic (after Sampson 1984: 248).

Many of the settlements were villages of considerable size with a populations above 100 occupants. Key sites are Saliagos off Antiparos, Grotta and Zas Cave on Naxos, Ftelia on Mykonos, Koukounaries on Paros, Minoan on Amorgos, Akrotiri on Thera and Agrilla and Kouphi on Melos (Figure 4.5). The location of settlement sites appears to have been determined by shared concerns about defence as well as ease of access to the sea and fertile lands. For example, Mavrispilia on Mykonos and Vouni on Antiparos are located on the summit of steep hills overlooking broad bays; Saliagos is situated on a promontory commanding the land bridge between two bays with easy access to good agricultural land. Settlements were relatively long-lived. Once abandoned, subsequent settlements were located in new

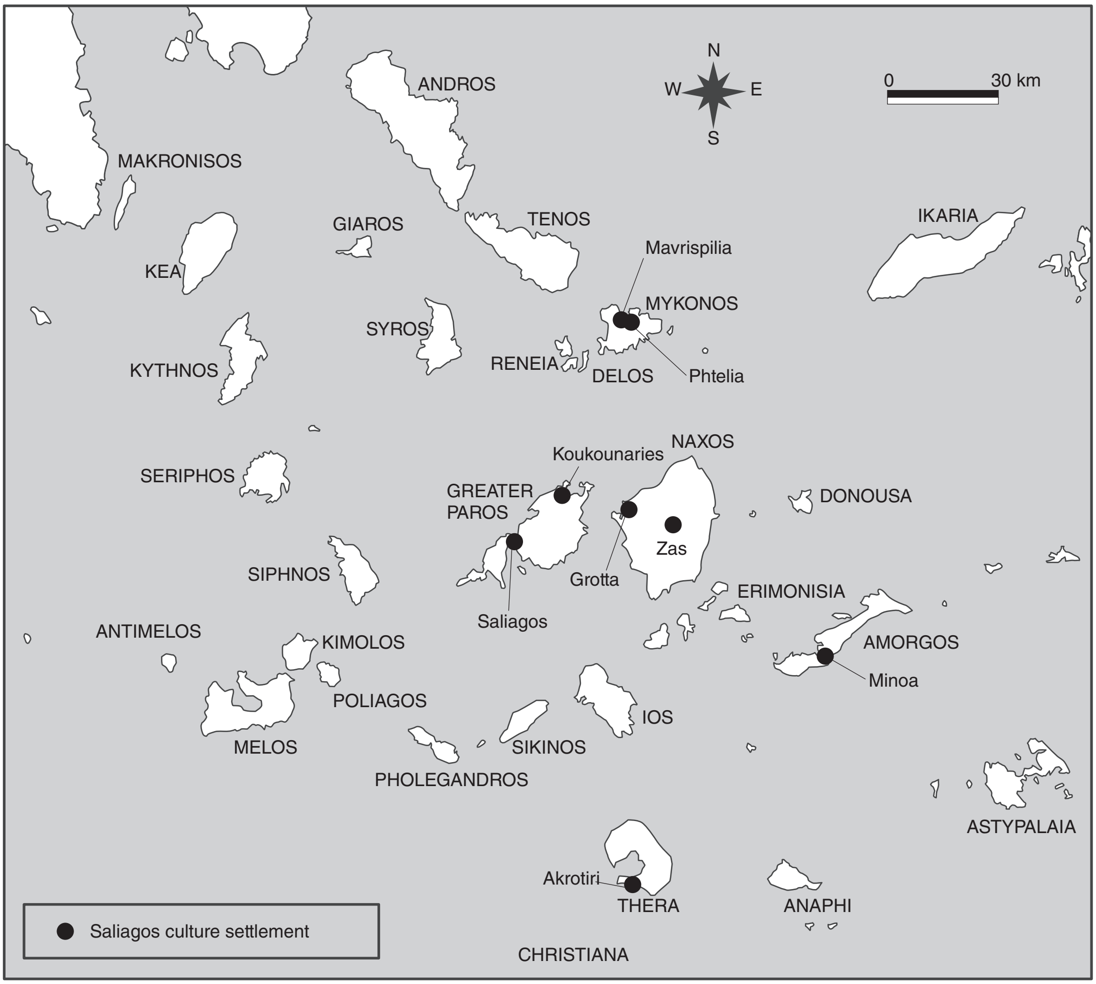


Figure 4.5 Map of Saliagos culture sites (after Broodbank 2000a: Fig. 34).

locales (Broodbank 2000a: 145–149). Inhabitants of these villages shared agricultural practices and material traditions, including a preference for dark burnished ceramics with Matt-Painted decoration and ‘cheese-pots’, a distinct pottery shape with perforations around the rim. Although the site distribution shows the Saliagos culture to be a phenomenon exclusive to the Southern Aegean, archaeological evidence highlights manifold contacts that the villages had with regions further afield. Mainland pottery types, obsidian from Giali in the Dodecanese, gold from Anatolia or the Balkans, copper from Attica as well as similarities in ceramic types and marble vessels show that their interaction sphere reached to the Greek mainland and the Anatolian coast.

The Saliagos culture is named after the main settlement site of this period, Saliagos, excavated by Evans and Renfrew (1968) in the 1960s. Today, Saliagos is a small islet off Antiparos rising a mere 5 m above current sea level. During the Neolithic, the sea level would have been about 6 m lower. As a consequence, Saliagos would have formed a north-facing promontory on a narrow land bridge connecting the islands of Antiparos and Paros. The location of the settlement had much to offer: inhabitants were able to oversee movement across the causeway, a fresh water source was nearby, arable land was available on either island and bays suitable for beaching ships existed both to the east and west of the site. The settlement is dated to the Late Neolithic (ca. 5,300–4,200 BC).

The excavation by Evans and Renfrew (1968) revealed a settlement of rectangular mudbrick houses built on stone foundations, enclosed by a perimeter wall with buttresses. No burials were discovered, and the excavators have speculated that a cemetery may have been located outside the settlement, but was covered by the rising sea.

Finds include pottery, stone objects, figurines, ornaments and tools (Figure 4.6). The vast majority of ceramic vessels are open shapes, such as bowls and chalices, while jars of different types are comparatively rare. Most of the pots were produced locally, though no evidence of a kiln has been found. Vases, especially those made of fine clay, are decorated elaborately. The most characteristic decoration is white-painted geometric motifs on a dark burnished background. Coarse vessels often only have applied or impressed decoration.

In contrast to locally made pots, raw materials for the chipped stone industry were imported. Obsidian was the dominant raw material (95%), while other volcanic stones, quartz and flint were minor contributors. The vast majority of obsidian comes from Melos, though a handful of objects each are from Antiparos and Giali in the Dodecanese. The Melian obsidian was probably imported in the form of cores, one of which was found with its original cortex still in place. The presence of waste products as well as finished artefacts across the entire islet shows that obsidian was processed locally at Saliagos.

Among the small finds is an impressive range of figurines in marble and clay. The best known of these is a small marble figurine of a corpulent woman seated with crossed legs, affectionately named by the excavators as ‘The Fat Lady of Saliagos’ (Figure 4.7). Pendants, beads and adornments of bone, clay, shell and stone were found as well as fragments to two carefully worked marble bowls. Among the tools are 36 small stone axes that were probably imported from Naxos, 112 bone tools (e.g. bone points, chisel-ended tools, spatula) and shell spoons and scoops. A series of oval-shaped potsherds may have

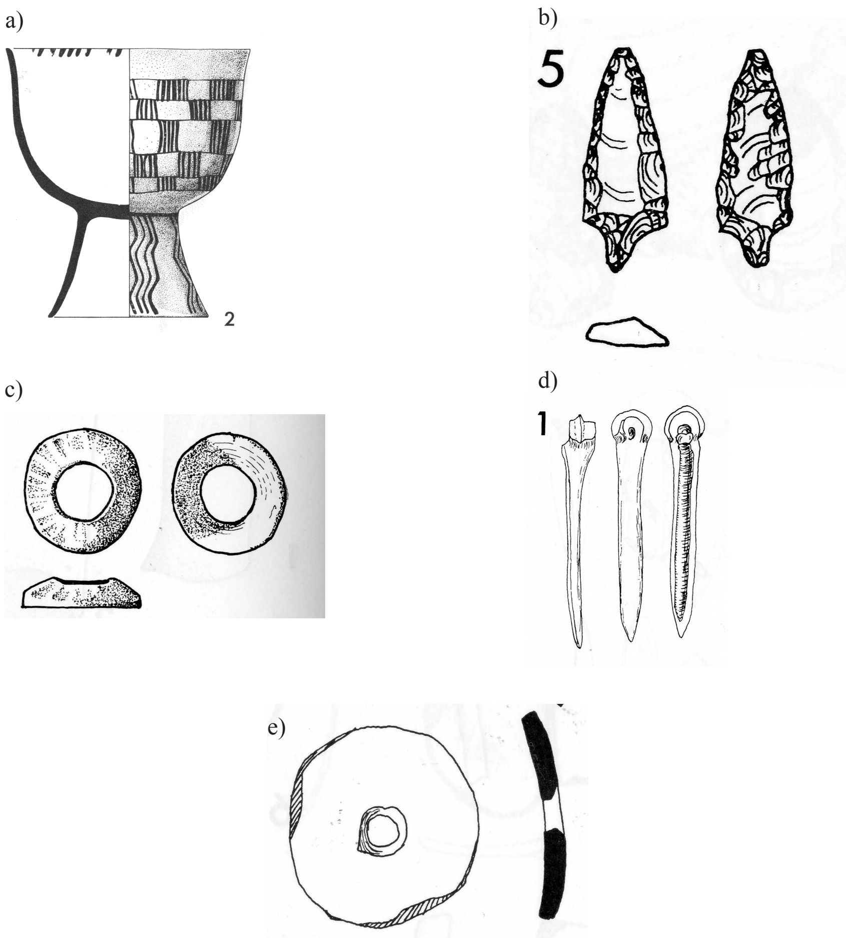


Figure 4.6 Finds from Saliagos: a) clay chalice, b) tanged obsidian point, c) shark vertebra pendant, d) bone tool, e) spindle whorl (Evans and Renfrew 1968: Figs. 31.2; 66.5; 78.5; 80.1; 84.10). Images reproduced with permission of the British School at Athens.

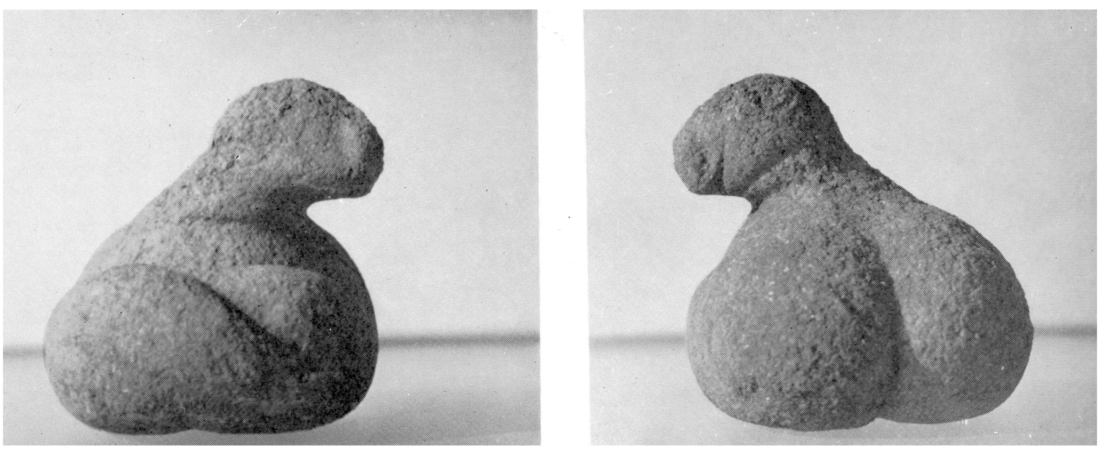


Figure 4.7 The Fat Lady of Saliagos (Evans and Renfrew 1968: Plate 42). Image reproduced with permission of the British School at Athens.

been used as burnishing tools. Their clay does not appear to be local and they may have been imported for their greater hardness. The presence of clay spindle whorls, stone weights, mortars, querns and pestles attest to the presence of a textile production, food processing activities and possible fishing nets. Evidence of basketry is only indirect through mat impressions on the bottoms of pots. Unlike other sites, no metal artefacts have come to light.

Based on archaeozoological and archaeobotanical evidence, the inhabitants made use of both the land and the sea to support themselves. They consumed predominantly 2-row barley with emmer and einkorn acting as supplementary crops. Surprisingly, we do not have evidence of pulses, fruits or nuts. Sheep or goat were by far the most common animal species (sheep/goat 83.5%; pig 12%; cattle 3.5%). As most animals were killed as juveniles, they were likely raised for meat production rather than wool or milk. However, the main source of food appears to have been fish, the bones of which add up to almost half of the entire animal bone assemblage. Most of the fish bones belong to large or very large specimens, most commonly tunny that had grown to ca. 2 m in size. The two whale vertebrae are probably not the result of a fishing venture, but the remains of a 3–4.5 m whale that stranded nearby and was then portioned up for food. Large amounts of shellfish supplemented the diet. However, there is no evidence that the inhabitants hunted deer or migratory birds.

Although the people of Saliagos engaged in mixed farming and animal husbandry, fishing was their predominant activity. Their preference for tunny hints at a degree of specialisation, while their predilection for large specimens attests to their considerable skill as fishermen. The sea clearly played an important, if not *the* most important role, in the lives of Saliagos inhabitants. Given the centrality of the sea, it should come as no surprise that Saliagos was connected to other regions in the Aegean through trade: obsidian from Melos and Giali, stones from Naxos, pottery imports (unprovenanced) and similarities in pottery shapes and decorations with the northern Aegean.

ATTICA-KEPHALA CULTURE

Pattern-burnished pottery and red-crusted ware show cultural affinities between settlements in Attica, Euboia and the Saronic Gulf, and are the hallmarks of the so-called Attica-Kephala culture. Until recently, Kephala on Kea was the only site in the Cyclades that shared this tradition. Naturally, therefore, scholars assumed that the culture was directed towards the Greek mainland. However, recent finds at Ayios Sostis on Siphnos, Zas Cave on Naxos and Strofilas on Andros, demonstrate that the Cyclades were in fact part of this cultural tradition and may have played an essential role in fostering maritime interaction between different regions (Figure 4.8). The Attica-Kephala culture is dated to the Final Neolithic, ca. 4,200–3,200 BC.

In the Cyclades, the type-site is Kephala on Kea which consists of both a settlement and, for the first time, a separate, extramural cemetery (Figure 4.9) (Coleman 1977). The settlement was extensive in area and was thought to have housed approximately 50 inhabitants. It was occupied for about 100 years at the beginning of the 4th millennium. Its position on a steep-sided promontory makes it easy to defend and ideally situated for easy access to well-sheltered harbour facilities.

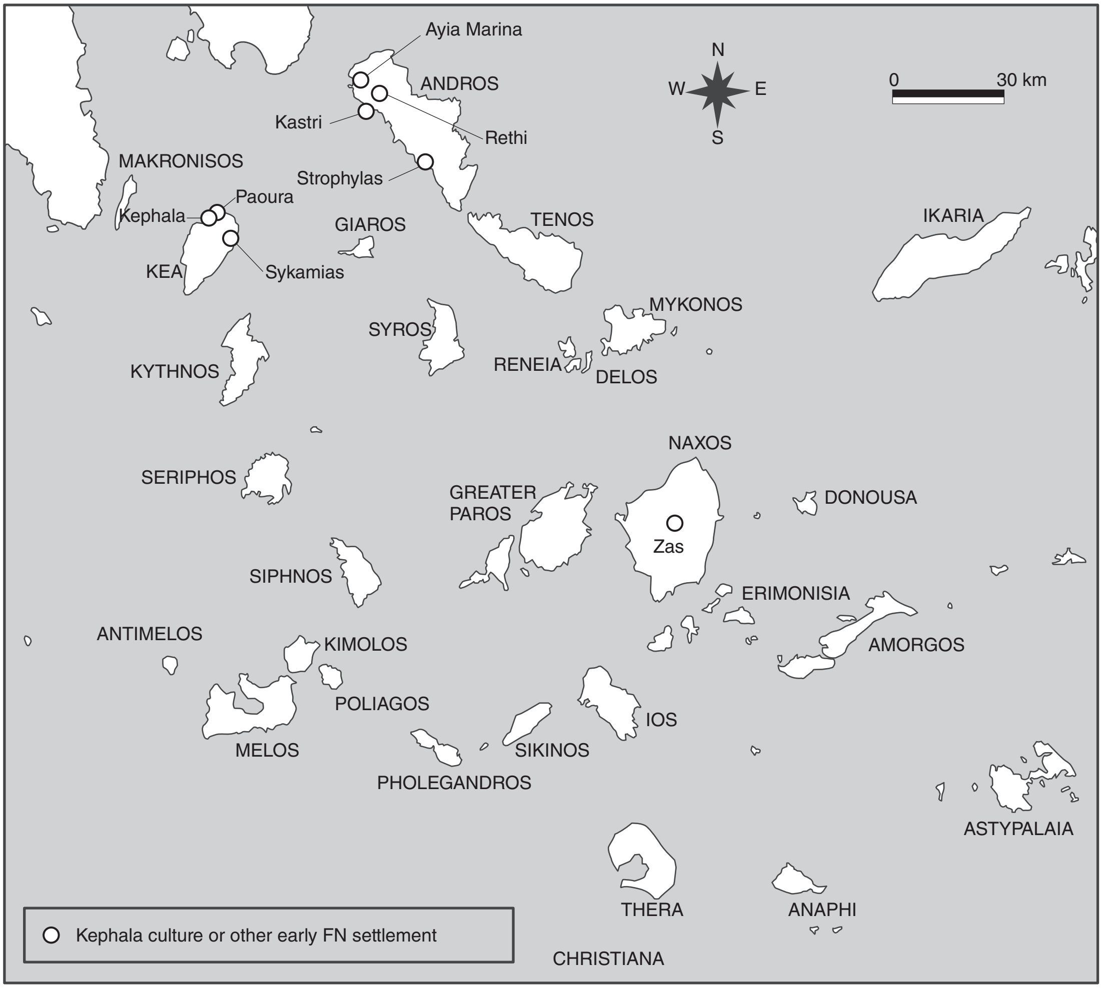


Figure 4.8 Map of Attica-Kephala culture or other early FN sites (after Broodbank 2000a: Fig. 34).

As the promontory was greatly eroded, only few walls survive from the settlement, though it is clear that some buildings (e.g. House Y which measured at least 6.7 x 3.3 m) were substantial in size. The lower section of houses consists of stone foundations. No evidence has survived of the upper sections which may have been constructed of mudbrick or stone. Two houses have benches inside. The most common find category from the settlement was pottery. All pots were made of coarse local clay and shapes included bowls, jars, scoops, stands, baking pans and straining vessels. Common decoration styles were burnished, pattern burnished, crusted red ware, incised, grooved and plastic appliques.

In contrast to locally made pottery, five marble vessels, six axe heads, and flint tools were all imported as finished artefacts from elsewhere. In addition, approximately 4,000 pieces of Melian obsidian have been found spread evenly across the entire site. The presence of cores, waste material, and finished tools is proof that the raw material arrived in the form of cores and was then processed on-site. Mat and cloth

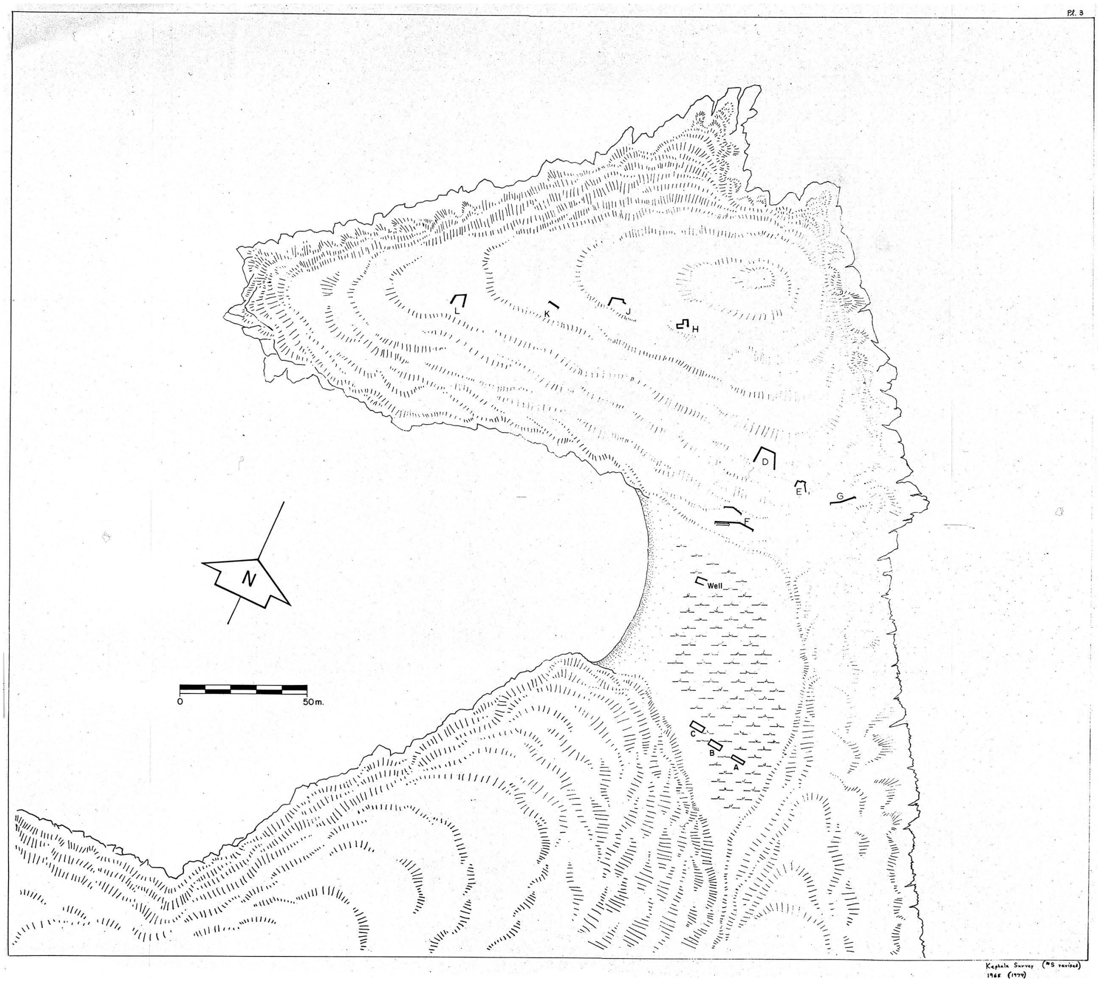


Figure 4.9 Plan of Kephala, Kea (Coleman 1977: Plate 3). Image courtesy of The Department of Classics, University of Cincinnati.

impressions on the pottery as well as possible spindle whorls and loomweights are testimony of local textile and basketry manufacture. More important is the existence of several copper objects and one lead object. While the source of these metals is as yet undetermined, the existence of crucibles and slag is a clear indicator that early metalworking took place at the site.

In addition to textile working, basketry, potting, and metalworking, the inhabitants practised mixed farming and animal husbandry. They grew cereals and pulses (grass pea and 6-row barley) and held sheep/goat (approximately 85%), cattle and pigs. Molluscs like limpets and murex shells were relatively common as nutritional snacks or possible fishing bait. Fishing was probably practised, but no fish bone evidence exists on the severely eroded promontory.

SETTLEMENTS

Surveys and excavations have revealed that most islands supported several, often rather small, sites. Scholars distinguish between open-air and cave sites. Many of the small sites had probably seasonal or short-term use. Large settlements served as permanent habitation sites, and cave sites may have been multi-functional, acting as habitation, burial or ritual sites. The best-known cave assemblage is that of Zas Cave on Naxos (Zachos 1999). The cave is located at an altitude of 600 m in the northeast of the island. The lowest layers (Zas I–II) have been dated to the Late and Final Neolithic periods. Residential use of the cave is indicated by the presence of pottery, obsidian (cores, debitage and finished tools), marble and metal objects. Saddle-querns and grinders provide evidence of food processing activities, while the pottery repertoire includes shapes for the processing, consumption and storage of both liquids and solids. A spindle whorl pays testimony to textile-making activities. Sixteen species of cereals and pulses have come to light in similar proportions as are known at open-air settlement sites, though the lack of weeds and processing residues makes it likely that the occupants did not cultivate fields themselves. The animal bone assemblage shows that the inhabitants slaughtered their sheep, goats and pigs for their meat. The estimated ages of slaughter reveal that this activity took place throughout the entire year (Halstead 2005).

Architectural remains from the Neolithic period are a rare occurrence in the Greek islands. The majority of our evidence for sites comes from small finds, many of which are unimposing. This imbalance in evidence has given rise to the assumption that Neolithic islanders lived in small hamlets or villages, led a simple and unassuming life, and made and utilised inconspicuous everyday objects (Sampson 1984). However, recent excavations of the settlement of Strofilas on Andros have altered this picture dramatically (Televantou 2008a). At 2.5–3 ha in size, Strofilas is a large settlement located atop a steep promontory with an extensive fortification wall with bastions across the saddle. These defensive structures are the earliest known in the Aegean islands. Excellent harbours are available on either side of the promontory and fertile agricultural land is in easy reach. The settlement itself was densely occupied with apsidal or rectangular buildings (Figure 4.10). The buildings stand out for their large size and number of rooms (e.g. Building Beta is 17 x 12 m; Apsidal Building One measures 10 x 6 m). Walls are constructed of rock and clay, and reached considerable thickness (0.6 m and 0.8 m), hinting at the existence of an upper floor. A large enclosed hall (100 m^2) is located in the centre of the settlement. The hall is divided into two sections, each at a different level. The southern section contains a large circular stone structure in its centre and a stone bench along its southern side. A large and complex rock carving with small stone cavities for possible offerings is located immediately in front. The carving depicts a boat, fish, spirals and figure-of-eight motifs. These important structural and iconographic features suggest that the hall was designed for ritual activities and may represent the first sanctuary in the Aegean islands.

Sizeable architectural remains have also come to light at Ftelia on Mykonos (Figure 4.11), a settlement of the Late Neolithic period (Sampson 2002, 2008c). Dated to around 5,000–4,500 BC, the site has four architectural phases. Particularly noteworthy is the degree of communal organisation that went into the planning and building of the settlement. In the first instance, occupants levelled the bedrock to prepare the surface for the erection of buildings. Excavations revealed at least eleven substantial

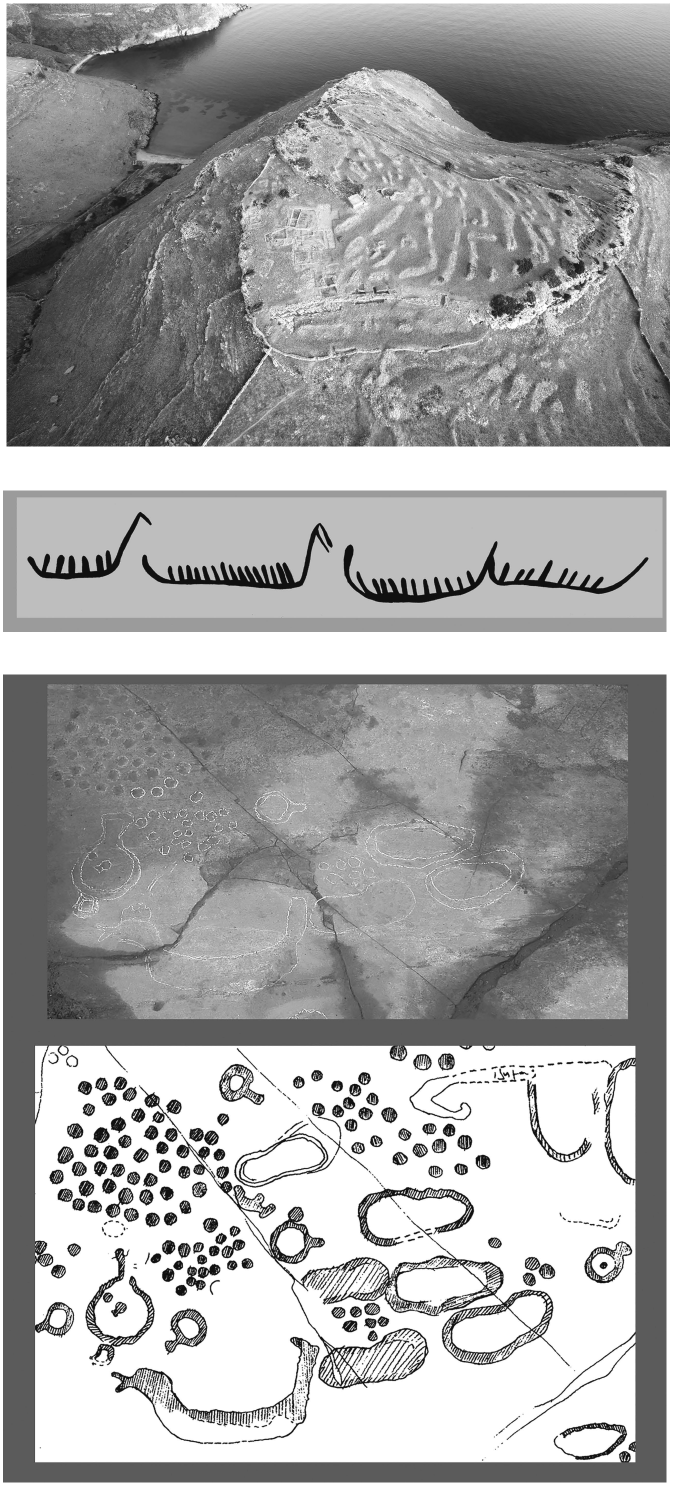


Figure 4.10 a) Aerial view of the Neolithic settlement of Strofilas on Andros (N. Xenikakis, 2008). b) Ships in procession. Rock-art representation on the fortification wall of Strofilas, Andros (drawing by C.A. Televantou. archaeologist). c) Rock-art representation from the floor of the sanctuary at Strofilas on Andros. Detail: duck, ring-idol motifs, small cavities and human "footprints" (drawing by K. Mavraganni, painter). All illustrations with permission from C.A. Televantou. Their use or reproduction must be authorised by C.A. Televantou.

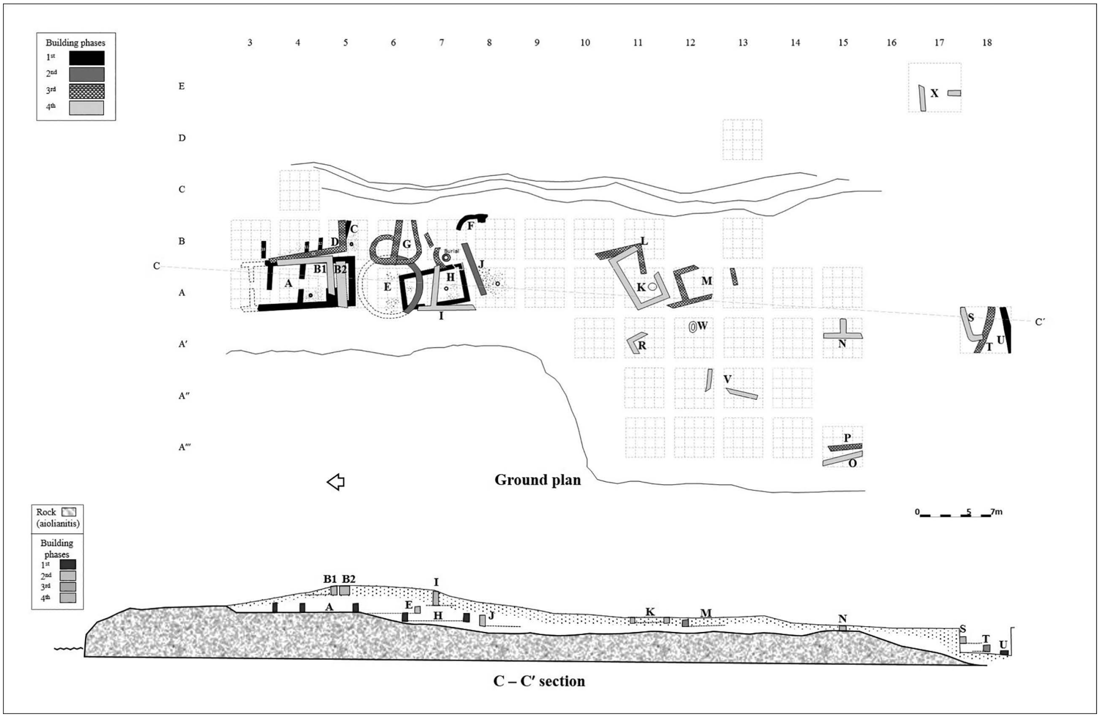


Figure 4.11 Plan of Ftelia on Mykonos. Image courtesy of A. Sampson.

stone-built structures. The largest, Building A, is situated at the highest point of the settlement atop the levelled terrace. The building had at least two large rooms and benches. An *in-situ* millstone hints at a residential function for this important house. Building B contained fragments of large storage vessels, plant remains (legumes, wheat) and stone grinders, and thus indicating a storage function. Building D has been interpreted as an obsidian workshop because obsidian cores, manufacturing debitage and finished arrowheads were uncovered there. Possible granaries are the ellipsoid Buildings G and H. The presence of beeswax in potsherds provides the very first evidence of the exploitation of bees in the islands (Roffet-Salque et al. 2015).

BURIALS

It is fair to say that our knowledge of Neolithic burial practices is rather limited. While a few island sites have revealed burials, the vast majority of people died without leaving a trace. We can only speculate as to their whereabouts – they may have been disposed of in the sea or buried in locations where archaeological evidence has not survived or sites that have not yet been excavated. The logical conclusion of this realisation is therefore that the burials we do have most likely represent special or otherwise non-representative cases.

Our knowledge of burial practices comes primarily from the Late and Final Neolithic, though they seem to represent continuity from the earlier Neolithic. Key islands sites with burial evidence are Ayios Petros in the northern Sporades (Middle and Late Neolithic), as well as Kephala on Kea, Kalythies Cave and Archangelos Cave on Rhodes, Emporio on Chios and Giali in the Dodecanese (all Late or Final Neolithic). Burial forms include primary and secondary inhumations, scattered bones and cremations. Of these, primary inhumations represent the most widespread type. Burials have been uncovered in open-air settlements, caves and cemeteries (Triantaphyllou 2008). (Figure 4.11). Grave goods, such as ceramic vessels, are rare.

A new development during the Final Neolithic is the deposition of the dead in specially designated extramural cemeteries, such as at Kephala on Kea, Tharrounia on Euboia and Giali in the Dodecanese. Rectangular, round or oval pits were cut into the ground and covered with stone slabs. At Kephala and Tharrounia, these graves were built of stone. The inhumed bodies were place into the graves in a contracted position. While most graves contained one individual, multiple burials exist on occasion. If grave goods are present, they normally consist of a single artefact.

The cemetery of Kephala has been published in detail (Coleman 1977). It is prominently located at the base of the headland which everybody has to pass to reach the settlement. The excavators discovered a lower and upper cemetery (Figure 4.13; see also Figure 4.9); in total the cemetery contained 65 inhumations in about 40 graves that had been in use for approximately 150 years. There may have been partitioning walls within and a boundary wall around the cemetery.

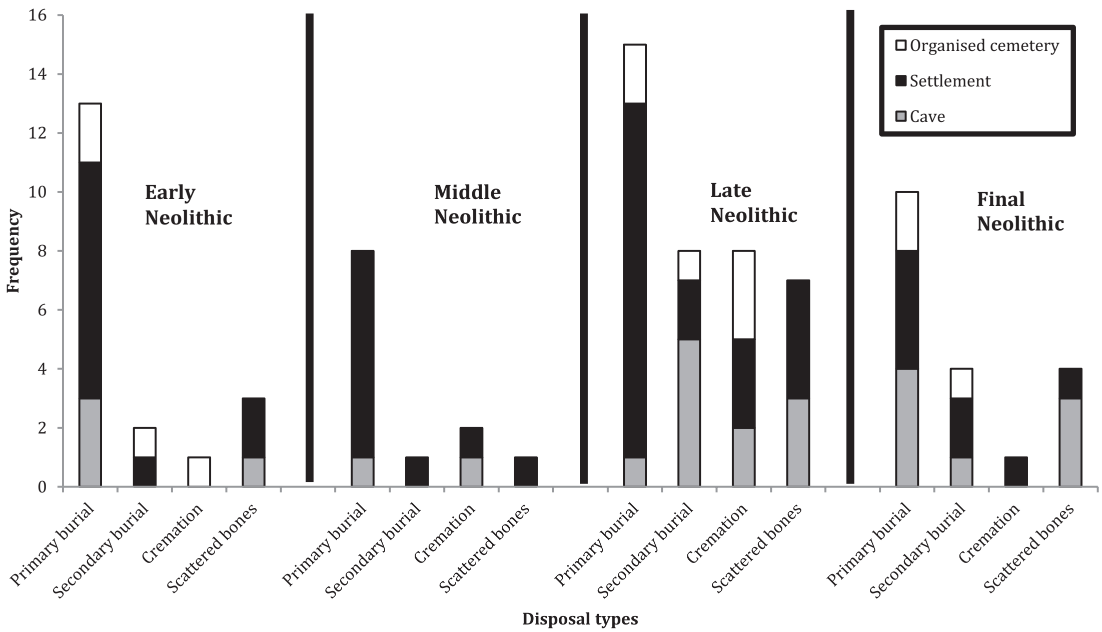


Figure 4.12 Burial methods in the Neolithic Aegean (after Triantaphyllou 2008: Fig. 8.1).

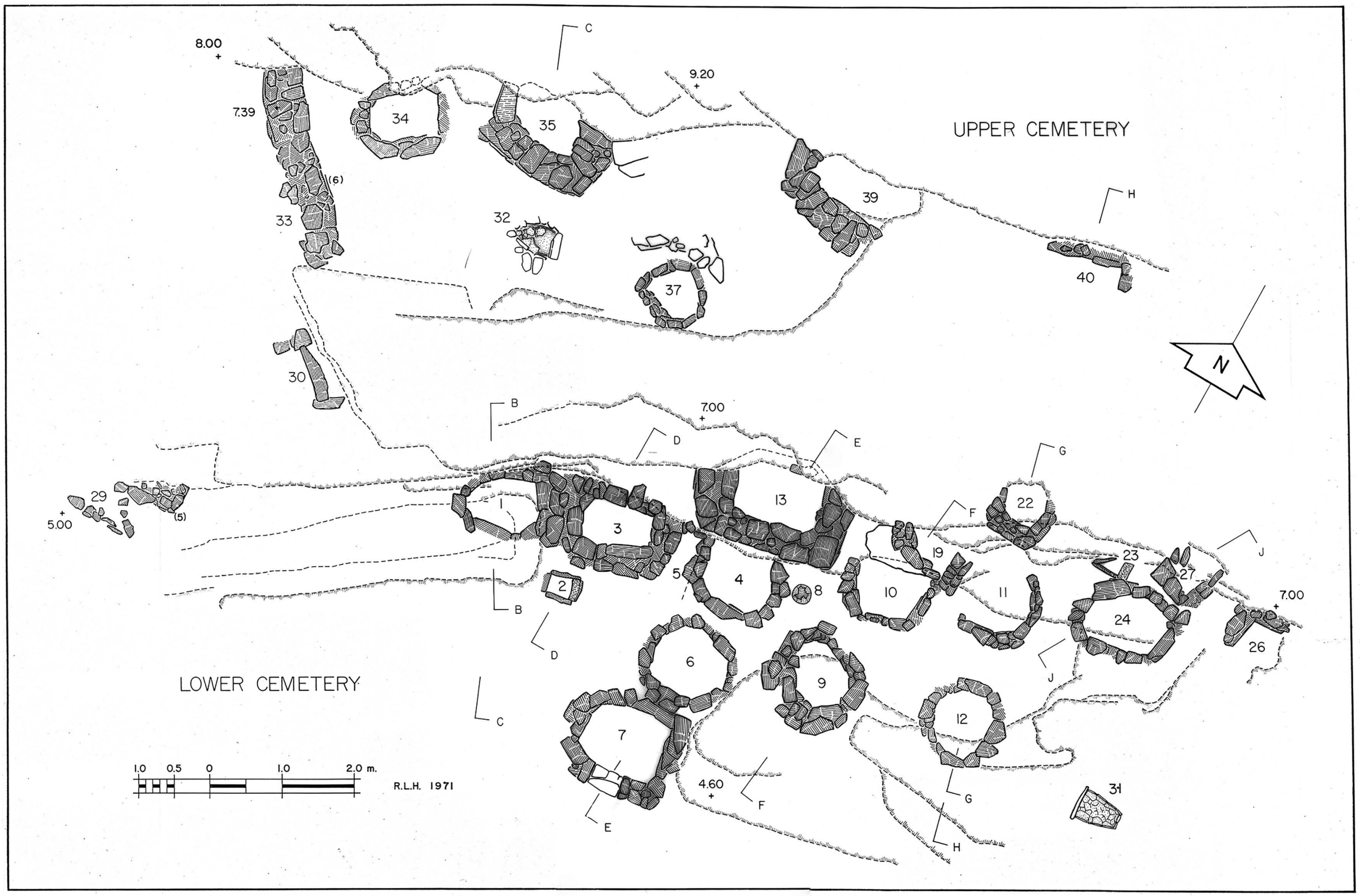


Figure 4.13 General plan of Kephala cemetery (Area F), Kea (Coleman 1977: Plate 8). Image courtesy of The Department of Classics, University of Cincinnati.

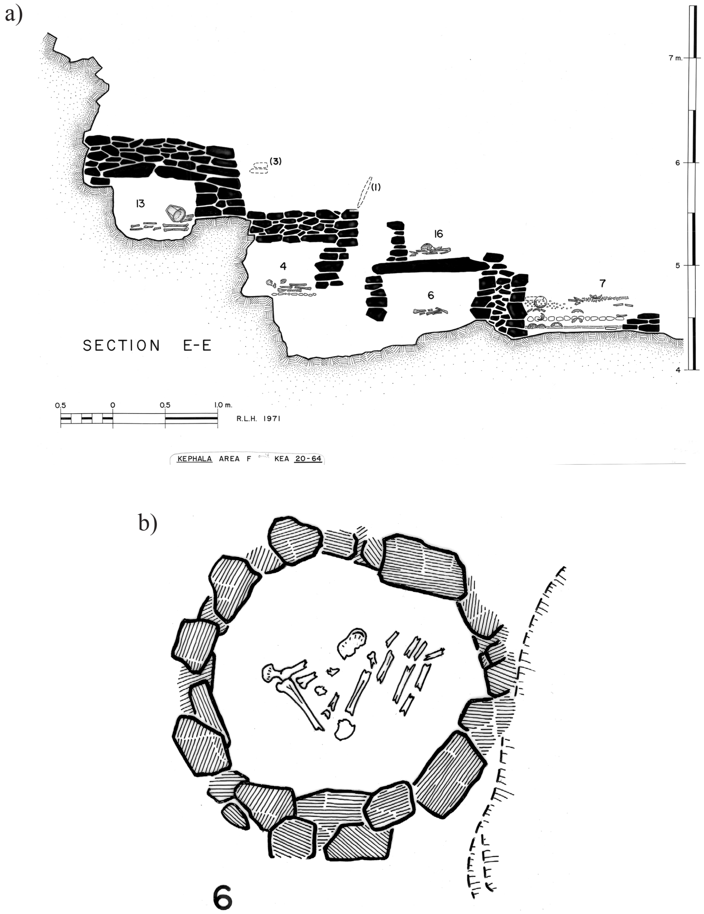


Figure 4.14 a) Lower Cemetery, section through Area E and b) plan of Grave 6 (Coleman 1977: Plates 15 and 18). Note the platforms on top of Graves 13 and 4. Images courtesy of The Department of Classics, University of Cincinnati.

The majority of graves were rectangular, circular or oval and constructed of irregular stone walls (Figure 4.14). They were covered with several large slabs of schist. The two cist graves and three jar burials were used for child burials only. Grave offerings were rare and are only attested for nine graves. Offerings normally consisted of one single ceramic vessel. Seven graves had platforms, or solid stone structures, constructed above the cover slabs. At only 40 cm height, they were unlikely to have a structural purpose. Instead, the excavators have suggested their use as an altar for libations or other ritual practices. The fact that many fragments of pots, obsidian and figurines were found in the soil around the graves may provide circumstantial evidence that grave offerings were placed on the platforms after the graves had been closed.

All burials were inhumations with the contracted skeleton laid out on a surface of pebbles. Half of the burials contained remains of one person only while the remaining half contained two to 13 skeletons and thus probably represent family tombs. With the exception of a link between children and jar burials, an analysis of the skeletal material and accompanying grave goods did not reveal any patterns in relation to age, gender or status. The only discernible difference was that multiple burials were restricted to the lower cemetery – whether this is a reflection of differences in status, ritual practices or mere changes through time is impossible to determine.

While the excavators of Kephala have argued that the inhumations represent primary burial, Triantaphyllou (2008) has argued that the recognition of scattered adult bones, often mixed with faunal remains, at many sites hints at the practice of secondary manipulation of those who had passed away. Following van Gennep's recognition that all rites of passage, such as birth, marriage and death, are broken down into rites of separation, rites of transition and rites of incorporation (1960), we can assume that secondary funeral rites formed part of the islanders burial practices – even if we lack an understanding of the specifics.

SUBSISTENCE

Archaeobotanical evidence shows that cereals and pulses were the staple food for people in the Neolithic and were probably of roughly equal importance. The most common cultivated cereals are barley (*Hordeum distichum* or *H. vulgare*), emmer (*Triticum dicoccum*), einkorn (*T. monococcum*), and bread wheat *(T. aestivum*). Among the legumes there is evidence of lentil, grass pea, bitter vetch, chickpea and horsebean. Fruits and nuts were probably wild and included grape, olive, figs and almonds (Hansen 1988: Table 1; Sarpaki 1992b: Table 1c; Megaloudi 2006: Table 5.8). Most sites utilised a wide mix of cereals and pulses; for example 16 plant species were recognised at Zas Cave on Naxos alone (Zachos 1999: 157). New arrivals are several cereal types, such as spelt wheat, rye and glume wheat that are more frequently found in northern Greece (Megaloudi 2006).

The most commonly represented domestic animal species in the Aegean islands are sheep, goat, cattle and pig (Figure 4.15). While mainland and island bone assemblages are similar in the types of species represented, island sites show a particular and marked preference for ovicaprids (sheep and goat) where they add up to 80–90% of the animal bone assemblage (compared with 55% for mainland sites). Phoca-Cosmetatou (2011: 86) argues that this differentiation is the result of farmers adjusting their practices to specific environments and climates. For example, the harsher grazing conditions on the Aegean islands which "lacked large pastures or forest cover suitable for cattle and pig" will have made islands more suitable for sheep and goat herding. Once settled on the island, the inhabitants did not adjust their agricultural practices later: as the faunal evidence from Ftelia on Mykonos suggests, the types (goat, sheep, cattle and pig) and proportions of species remained constant throughout the two settlement phases (ovicaprids 87% and 82%). Likewise, the age of slaughter did not change over time and continued to target juveniles (Phoca-Cosmetatou 2008).

a)

	Domesticates			Wild
	Sheep/Goat %	Pig %	Cattle %	Wild resources %
Mainland sites				
Vassilika	60	16.3	23.2	0.51
Ayia Sofia	40.9	41.8	13.2	4.14
Tharrounia Ia	69.3	18	7.9	4.81
Thermi	53.4	19.6	21.9	5.1
Sitagroi II	49.3	20.3	25.1	5.35
Pefkakia (NR)	56.8	23.5	12.8	6.91
Tharrounia Ib	70.8	16.4	5.5	7.35
Magoula Zakrou	58.2	15.8	17.2	8.61
Franchthi	70	10.2	10.2	9.97
Arapi-Otzaki	46.6	31.6	12	9.88
Sitagroi III	47	15.7	27.2	10.16
Dimitra II	57.7	20.5	11.3	10.44
Tharrounia Iia	64	21	4	11.04
Pefkakia (NF)	45.9	23.5	19.5	11.06
Dimini	59.1	19.1	10.7	11.1
Kastria	68.5	14	6	11.6
Paradeissos	47.5	17.6	20.7	14.24
Ayios Dimitrios	50.6	22.4	5.2	21.85
Dimitra III	50.6	20.4	7.4	43.62
Cycladic Island sites				
Zas	93.5	5.5	1	0
Ftelia	85	12	3	0.1
Kefala	82.6	9.3	8	0.19
Saliagos	83.5	12.5	3.5	0.5

b)

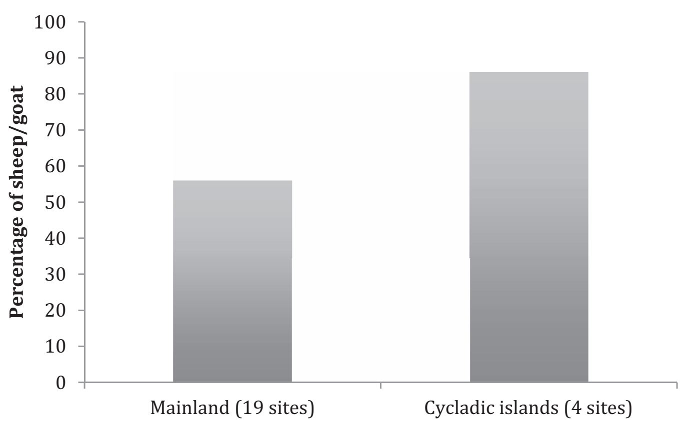


Figure 4.15 a) Food preferences for domesticated and wild foods at Aegean sites (nb: only major domesticates are listed). b) Comparison of sheep and goat consumption between mainland and island sites (after Phoca-Cosmetatou 2008: Table 5.2 and Fig. 5.4).

Age of slaughter is an important indicator of the herding strategies farmers pursued. Scholars distinguish between three main models: meat, milk or wool/traction production (Payne 1973a). The purpose of meat production is to increase the amount of meat available for human consumption. With males growing faster than females and young animals gaining weight fast, a focus on meat can be deduced from many juvenile and subadult deaths and selective slaughter of young males. Milk production attempts to maximise the number of lactating females through slaughter or early weaning of kids and lambs. The herd will therefore primarily exist of adult females. Wool/traction strategies can utilise both sexes as they live into adulthood. Unfortunately, these models represent idealised examples of *intensive or specialised* production for a single product. During the Neolithic, however, all evidence points towards non-intensive exploitation of animals and hence less clear-cut slaugher patterns. Whichever strategy was the primary focus, it is likely that farmers pursued secondary strategies alongside to maximise their benefits (Halstead and Isaakidou 2011).

An analysis of mortality patterns by Halstead (1996: Table 1) and Isaakidou (2006) has demonstrated that sheep/goat farmers in the Neolithic Aegean pursued a meat strategy. It is likely that milk and wool were utilised whenever possible, but herd composition was not specifically adapted to the maximisation of these secondary products. Despite clear evidence of herding strategies for the purpose of meat consumption, isotope analysis of Neolithic human remains has shown that the contribution of meat to the diet was modest and most of peoples' calories were provided by eating cereals and pulses (Papathanasiou 2003). In contrast to its small nutritional role, meat is likely to have had considerable social and economic significance. In particular the consumption of large carcasses will have provided opportunities for sharing between households, thus fostering ties between families (Halstead 2006).

In addition to cultivated crops and domesticated animals, people also consumed wild plants and animals. The contribution of wild plants (e.g. olive, figs) and animals (e.g. bird, deer) to the Neolithic diet was generally small; in relation to island sites it is virtually negligible (Figure 4.15) (Phoca-Cosmetatou 2008). Fishing was another activity subsidiary to husbandry and agriculture as is apparent from recent isotope analyses which show that the diet of Neolithic people was predominantly terrestrial (Papathanasiou 2003). Fishermen did not target a single species, but relied on varied catches of coastal or migrating fish that could be caught from the shore. At the Cave of Cyclope on Youra, for example, specialists identified nine families. Of these, sea bream (*Sparidae*) were dominant (39%), followed by groupers and combers (*Serranidae*) (21%) and scorpionship (*Scorpaenidae*) (4%) (Powell 2003: 78–79). The only site with a non-conforming archaeozoological profile is Saliagos. Here, fish bones add up to about 50% of the total bone assemblage and hint that fishing was probably the dominant subsistence activity, with the cultivation of barley, emmer and einkorn, and the exploitation of sheep/goat, pig and cattle taking second place (Evans and Renfrew 1968).

POTTERY AND SMALL FINDS

The later Neolithic is characterised by regionalism in pottery traditions (Alram-Stern 1996: 145–162). Sampson (2008b) distinguishes between five distinct cultural zones (Figure 4.16):

1 The northeast Aegean, including the islands of Lemnos and Lesbos, and stretching across to the Anatolian coast
2 The Dodecanese with Chios and Samos
3 Attica, Euboia and the Cyclades (during the Final Neolithic)/the Cyclades only (during the Late Neolithic)
4 The islands of the northwest Aegean, including Skyros
5 Crete

Contacts existed between these cultural regions. For example, the Attica-Kephala culture shared many similarities with the northeast Aegean, while the Northern Sporades had their greatest affinities

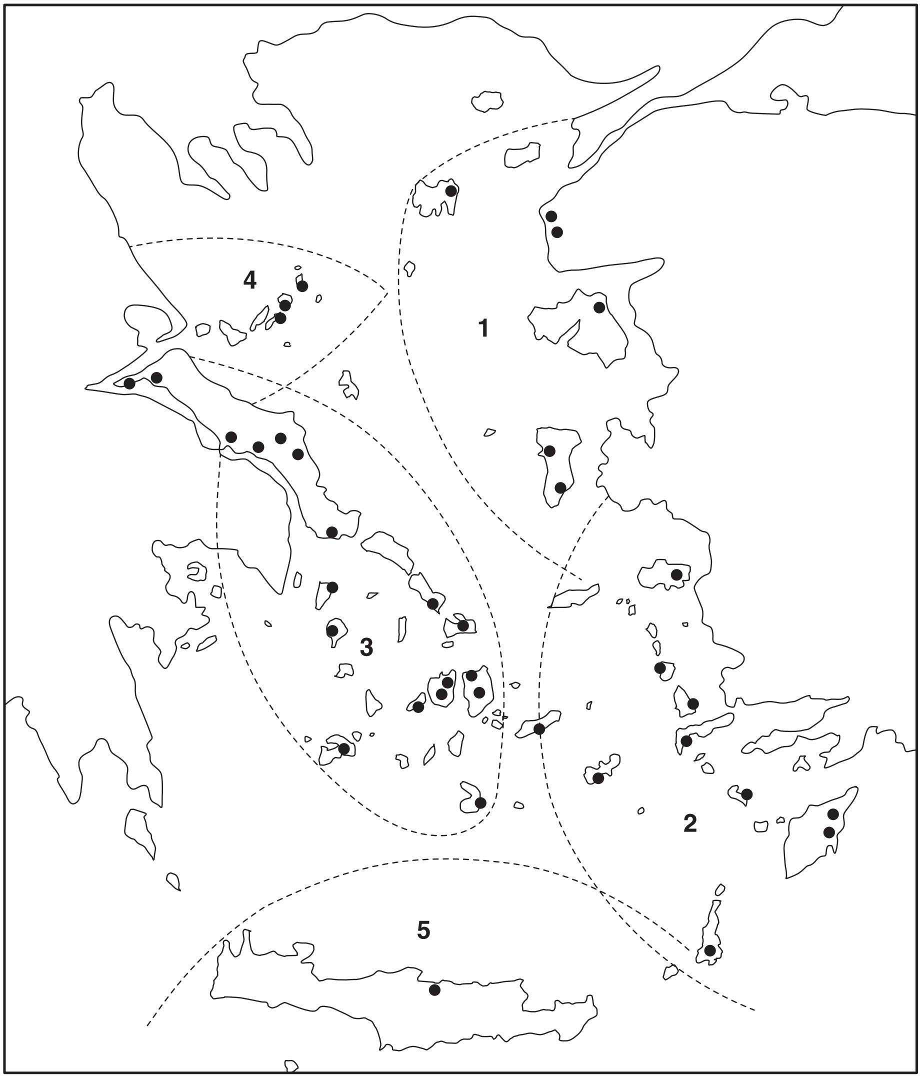


Figure 4.16 Pottery tradition in the Late Neolithic: 1) the northeast Aegean, 2) the Dodecanese 3) Attica, Euboia and the Cyclades, 4) the northwest Aegean, 5) Crete (after Sampson 2008b: Fig. 10).

with the Greek mainland and Euboia. In particular the distribution of so-called cheese-pots is concrete evidence of manifold and regular sea voyages between different regions, and shows that a shared cultural *koine* extended from west Anatolia to the eastern Greek mainland.

Later Neolithic pottery shapes were often simple in profile and comparatively easy to make. Popular shapes were bowls (shallow, straight-sided, carinated), jugs and jars and large storage vessels. In contrast, their surface treatments and decoration were often striking and time consuming to produce. In particular, the act of burnishing, that is rubbing a hard object or stone against the surface of a leather-hard pot to create a sheen, took time, skill and patience. Complex decorative patterns were often applied to the inside and outside of a vessel. The attention to detail and effort invested was thus considerable. It is likely that the labour invested in these highly decorative wares – most frequently bowls – relates to the function and social context in which they were used.

In the Aegean islands, two well-known pottery traditions have been identified and are commonly used as chronological markers. The first tradition is associated with the Late Neolithic 'Saliagos culture' (Figure 4.17). By far the most popular shape is the simple bowl. Other vessel shapes include 'fruitstands', and jars in small and large sizes. Pots are of a dark burnished ware with white painted decoration. Decorative patterns are varied and include zigzags, lozenges, arcs, wavy lines, chequer board motifs, and a range of other motifs. Coarser fabrics most commonly use applied or impressed decoration. Saliagos-type ceramics are predominantly found within the Cyclades, although grey wares popular in Euboia and the Northern Sporades exhibit close affinities with this ceramic type.

The second major ceramic tradition, dated to the Final Neolithic, relates to the 'Attica-Kephala culture'. Its main distribution ranges from the northern Cyclades, Attica and Aegina, to Euboia. Common shapes include bowls and jars, while rolled-rim bowls only become common in the later phase (Figure 4.17). Vessels are characterised by red monochrome, pattern-burnished or red-crusted decoration; incised patterns (often filled with a white substance) are also common. The enigmatic 'cheese-pot', a large shallow basin with a perforated rim, is a late feature of the 'Saliagos culture' and continues into the 'Attica-Kephala culture'. The Dodecanese, Samos and Chios favour wide bowls with black or red monochrome burnished decoration. However, during the Final Neolithic, red burnished and red-crusted wares make their appearance also in the Dodecanese. Bowl shapes have now become a little more complex and include s-shaped profiles (Alram-Stern 1996).

Equipment from the domestic sphere is rich and varied. In addition to hearths, grain storage facilities and ubiquitous pottery, there is evidence of millstones, grinders, flaked stone tools, bone tools and spindle whorls. Impressions on the bases of pots indicate that textile manufacture and basketry were practiced (Demoule and Perlès 1993). Shell jewellery, stone pendants or beads, and marble vessels are comparatively rare. Human (schematic and 'fat lady' types) and animal figurines were made of clay or stone, and have been unearthed from Late Neolithic settlement contexts at Saliagos, Sangri on Naxos and Ftelia on Mykonos. The function of these figurines is not fully understood. Interpretations range from representation of goddesses, to fertility symbols, magic or healing devices, toys and educational tools (for example, for the application of body ornamentation) (Talalay 1993). Association of figurines

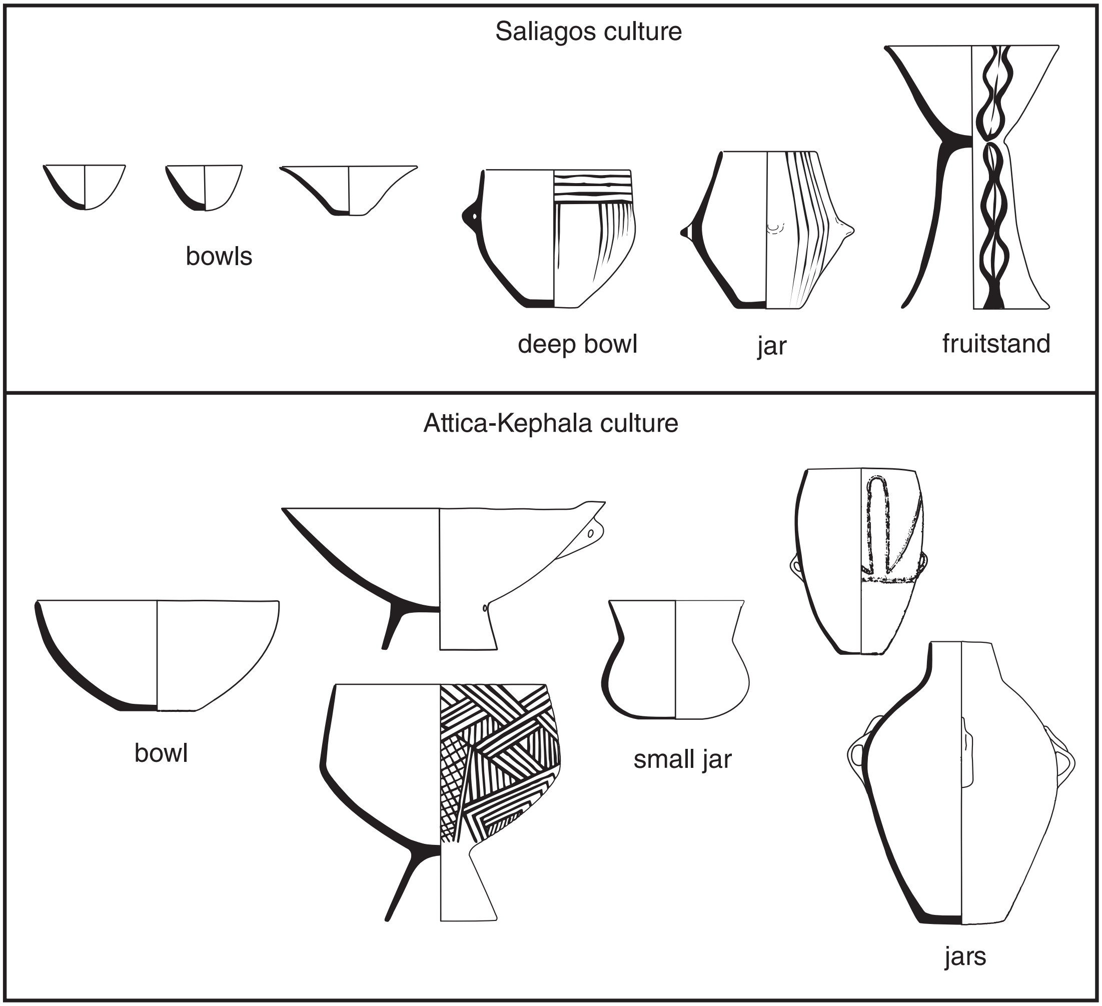


Figure 4.17 Common pottery shapes of the Saliagos and Attica-Kephala cultures (after Coleman 1977; Evans and Renfrew 1968).

with death, burial rites or ritual contexts occurs for the first time at the Final Neolithic cemetery at Kephala on Kea where figurines were found in the vicinity of the graves (Renfrew 2017).

OBSIDIAN

Obsidian from the island of Melos has come to light at almost every excavated Neolithic site in the Aegean. The amounts vary from considerable to minor. Sites further away generally contain

fewer amounts and often only finished products (e.g. Thessaly and Macedonia). In contrast, large quantities of obsidian reached nearby sites in the form of cores which were then made into tools locally. The distribution zone of Melian obsidian did not reach beyond the Aegean Sea; it was particularly abundant in the Cyclades, Crete, Euboia, southern and central Greece, and the Dodecanese. Obsidian from Antiparos is only attested at Saliagos where it is present in minute amounts. Giali obsidian is common in the Dodecanese, but has a limited distribution range in the south-central Aegean (e.g. Saliagos, Knossos) which only increases in the later Bronze Age when it was used for the manufacture of obsidian vessels (Renfrew and Wagstaff 1982: 191; Georgiadis 2008).

Two competing hypotheses have been proposed to explain the extensive distribution of Melian obsidian in the Neolithic and Bronze Age. The first theory has been called the Commercial Trade Theory. It postulates that obsidian was a source of wealth and its exploitation and trade were therefore controlled by the inhabitants of Melos who traded it widely across the Aegean (Bosanquet 1904b: 230). The second hypothesis, the Direct Access Theory, was put forward by Renfrew (1972). It stipulates that obsidian was not a very valuable commodity and as such access to it was unregulated and open to all. In Renfrew's view, the wide distribution of Melian obsidian was the consequence of consumers having free and unhindered access to the source. To assess the validity of the competing hypotheses, Torrence (1982) undertook a detailed survey of the two obsidian quarries on Melos. In particular, she investigated the nature of building structures, artefacts and activity areas as well as the obsidian outcrops to determine the degree to which access to the source was regulated and production was controlled (Figure 4.18). For example, she investigated aspects such as boundary walls, labourer housing, transport installations, specialised tools, standardised processing techniques, skilfulness of production, skilfulness of raw material extraction and spatial patterning of activity areas. Her results indicated that the exploitation of Melian obsidian sources was very unsystematic and unorganised, and thus most likely undertaken by visitors who were relatively unfamiliar and unknowledgeable; she observed no evidence of control or specialisation: no structural remains or artefactual evidence of domestic activities existed. Similarly, no boundary walls or port facilities could be detected. Equipment used for the quarrying and processing was rare and not speciliaised. Indeed, it appears that many of the tools found were probably created quickly and easily on site before being discarded immediately after use. All obsidian outcrops, regardless of their quality, were utilised, although the best quality obsidian outcrops were utilised more often. The variability among waste materials and cores was great, indicating a wide range of knapping techniques. The knapping waste products do not show specialised work areas for different stages of the production sequence. Torrence concluded that the archaeological evidence does not conform to the predictions of the Commercial Trade Theory, but supports Renfrew's Direct Access Theory. Exploitation was opportunistic, inefficient, inconsistent and unorganised; the people involved in mining obsidian did not possess specialised skills and did not produce standardised products. They were not middlemen but most likely visitors who extracted the raw material for their own needs.

Evidence type	Indicators of commercial exploitation of obsidian sources	Results of Torrence's analysis of Melian obsidian
Landscape	Well-defined boundaries and spatial segregation of areas	No boundaries or spatially segregated areas
	Differential use for special activities	Special activities areas not well delimited
	Differential use for individual stages in extraction or production	Special activities areas not well delimited
Structures, quarry	Boundary markers	No boundary markers
	Defended boundaries	No boundaries
	Buildings associated with collection of fees for use-rights	No structural remains
	Buildings to house labourers	No domestic dwellings
Structures, port	Installations to facilitate loading of obsidian	No facilities for the loading of obsidian
	Defensive structures	No structural remains
	Buildings associated with collection of fees for use-rights	No structural remains
Obsidian sources	Sustained exploitation of obsidian over lengthy periods of time	Sustained exploitation of obsidian over lengthy periods of time
	Amount of extraction related directly to qualities of obsidian source	Preference for best quality obsidian, but all outcrops exploited
	Extractions specialised to one type of outcrop	All sources quarried
	Use of sophisticated, specialised technology for extraction of obsidian	Minimal investment in technology and skill for extraction of obsidian
Artefacts	Tools specialised for extraction and production	No specialised tools for extraction or production
	Pottery and other artefacts discarded in conjunction with temporary or permanent occupation by guards or quarry labourers	No domestic artefacts
	Standardised size, shape, method of manufacture, techniques for recovery from mistakes, etc. of all products	Great variability in size, shape, method of manufacture, techniques for recovery from mistakes, etc. of all products
	Standardisation of debitage types, sizes, and shapes	Highly variable debitage types, sizes and shapes
	Waste from production of tools for use by residents at site	No domestic dwellings

Figure 4.18 Modelling obsidian extraction at Melos. Landscape, architectural and artefactual features at Melian obsidian quarry sites (based on Torrence 1982: Table 15.7).

METALLURGY

The use of chipped stone tools is the hallmark of the Stone Age. However, towards the end of this period in the Late Neolithic we witness the first appearance of metal artefacts in Greece. Early metal tools appear to have imitated existing stone and bone tool types, but their introduction did not lead to a decline in the use of lithic materials or, conversely, to the invention of new tools (Karimali 2008). Metal finds – copper, lead, and silver – have been reported from mainland Greece (Thrace, Macedonia, Thessaly, Attica, Euboia and the Peloponnese) and Crete, as well as the Aegean islands (Thasos, Chios, Rhodes, Kea, Naxos, Mykonos and Andros) (McGeehan-Liritzis 1996; Stos-Gale and Gale 2003). Quantities remain small during the Neolithic. The most common objects are tools (awls, axes, chisels, tweezers), status symbols/weapons (daggers) and ornaments (pins, fibulae) (Zachos 2007). Lead isotope analyses of early Greek copper artefacts support a local origin for the metals, most likely Lavrion in Attica (McGeehan-Liritzis and Gale 1988). Lavrion was probably also one of the sources of silver and lead, the other source being the island of Siphnos. Both sites are well-known copper, lead or silver mines in the Early Bronze Age (Stos-Gale and MacDonald 1991; Gropengiesser 1986, 1987). Not much evidence of metal procurement is preserved at the mining sites as any traces have been destroyed by later activity. However, we have evidence of metal processing, such as clay furnace components and pottery, inside the mining galleries at Ayios Sostis on Siphnos (Gropengiesser 1986, 1987), furnace parts and copper slag at Kephala on Kea (Coleman 1977), smelting by-products at Strofilas on Andros (Televantou 2008a) and Limenaria on Thasos (Papadopoulos 2008). Gold, on the other hand, is very rare. A gold bead from Strophilas on Andros, a pendant from Ftelia on Mykonos and a gold sheet from Zas Cave on Naxos are the only examples known from the islands. There are no gold sources in Greece and the artefacts must have been imported from elsewhere; likely source areas are Anatolia or Macedonia. Taken together, the evidence suggests that Neolithic metal use was widespread and well established in the Aegean for both practical and symbolic purposes (Sherratt 2007). The fact that quantities are still relatively small is likely the result of patterns of deposition, and later recycling.

SEAFARING, MOBILITY AND INTERACTION

Movement across the Aegean Sea has been a constant feature of Greek life since the Palaeolithic. However, the Neolithic – and in particular the later Neolithic – saw the intensification of local and regional exchange networks as well as a dramatic proliferation of settlements into the Aegean islands. The wide-ranging distribution of raw materials and finished objects speaks to the great intensity and extent of maritime mobility, seafaring technology and skill. Raw materials were procured from within the Aegean as well as far beyond it; they include obsidian from Melos and Giali, metals from Lavrion and Siphnos, gold from Anatolia or the Balkans, kaolin (for infilling clay incisions) from Melos, marble from Naxos and Paros, and emery from Naxos. Affinities in ceramic styles and shapes, such as the

pattern-burnished and red-crusted decoration, and ‘cheese-pots’ of the Final Neolithic Attica-Kephala culture hint at regular technological and cultural interaction between island and mainland sites, and the emergence of a shared cultural and symbolic language within particular regions. Exotic items, such as gold or flint from outside the Aegean are comparatively rare, but speak to the desire of the islanders to relate “to the world beyond their islands by capturing such foreign objects as came their way” (Broodbank 2000a: 161).

Unfortunately, no physical remains of Neolithic crafts exist, but, as discussed in Chapter 3, it is likely that rowed or paddled boats were made of wood, hide or reeds (Bednarik 1999; Marangou 2001a, 2001b; Tzala 1989). Tzala’s successful experimental voyage in a replica reed boat demonstrates that even large distances could be traversed safely by using intermediate islands as stopover points (1995) (Figure 3.10). For the first time, however, we have iconographic evidence of ships. Rock carvings at Strofilas on Andros depict numerous ships, carved in groups or individually, of different sizes, shapes and types (Televantou 2008a) (Figure 4.10).

It is worth exploring the unique rock carvings at Strofilas in a little more detail as they provide not only evidence of the existence of boats, but are testimony of a distinct seafaring ethos that prevailed at the settlement. Strofilas is a Final Neolithic through to Early Bronze Age settlement on the west coast of Andros, conveniently located near two safe harbours and fertile agricultural land (Televantou 2008a). Across the water on the mainland lies Lavrion, the most important metal mines in Greece. Strofilas is a large (2.5–3.0 ha) fortified village dated to 4,500–3,300 BC. The most outstanding features of this settlement are its unique rock carvings, dated to the Final Neolithic period. Representations of naturalistic and narrative characters cover an area of 200 m^2, especially on bedrock just outside the fortification and inside the largest building of the settlement. The rock engravings depict agricultural practices, hunting of wild animals, as well as maritime activities, such as navigation, fishing and trading. Thirty-seven ship images have been uncovered so far. The panel near the external façade of the fortification shows at least “12 ships of various types and dimensions [. . .] (one with animal cargo), along with numerous animals, a large fish and a possible octopus” (Televantou 2008a: 47). Further rock-art images of boats in groups or individually can be found along the outside wall. A group of four boats may reference collective maritime activities, such as fishing or trading. Interestingly, the boats appear to face towards the entrance of the fortification. The most complex rock-art composition can be found inside the settlement in the large Hall: the central aquatic bird is surrounded by a large fish, numerous spirals and figure-of-eight patterns, and a group of boats. Rock cavities are located around this panel and may have been used for offerings. The unusual size of the building, its central location within the settlement, the unique rock-art composition and the rock cavities have led Televantou to interpret the large Hall as a sanctuary commemorating the pivotal role of the sea. The prominence of maritime activities and water in the depictions make it likely that these elements were the focus of the proposed ritual activity. The proliferation of ship depictions within and without the settlement is clear evidence of the centrality of the sea and maritime activities in the ideological and symbolic lives of the inhabitants (Televantou 2008a).

CONTEXTUALISATION: A NEW WAY OF LIFE

In contrast to the Greek mainland where evidence of the first permanent settlements dates to the Early Neolithic period, the Cycladic islands were first settled only much later in the Late/Final Neolithic period. In addition, when settlement occurred, it was relatively short lived. Traditionally scholars have assumed that the reason for this late and intermittant occupation was a result of the islands' inhospitable environment for the exploitation of which farmers lacked skills or technologies: in contrast to the large, long-lasting Neolithic villages on the mainland which were located near large fertile plains, islands were mountainous with few larger plains, received less rain, experienced greater erosion and had poorer soils.

Given that the Cycladic islands could only offer poor returns on harvests, scholars explained the sudden expansion of settlements into this marginal area in the later Neolithic by reference to innovations in subsistence practices and technologies that would have helped overcome these environmental disadvantages. They include:

1 The use of the plough to help cultivate poor soils
2 A replacement of wheat with the less water-demanding barley as a staple crop and a reliance on less demanding goat/sheep over cattle and pig
3 The domestication of wheat, vine and olive (the 'Mediterranean polyculture')
4 Greater use of wild resources
5 Increased reliance on secondary products such as milk and wool

1 In 1992 Pullen argued that the introduction of the scratch-plow permitted the expansion of agriculture into hitherto marginal areas and thus increased productivity. Direct evidence of the plow has not yet been found in the Aegean, but indirect evidence, such as clay figurines of cattle from Early Bronze Age contexts, exists. Unfortunately, the unique EH II yoked cattle figurine from Nemea is not well enough preserved to indicate whether its purpose was to pull a plow or to transport a cart. Additional indirect evidence is provided by traction-induced pathologies in bones of domesticated cattle at Knossos from at least the 6th millennium BC (Isaakidou 2006). However, drawing on examples of recent pre-mechanised communities, Halstead (2008) questions the implied value of this new technology: cattle require abundant good-quality grazing land and thus their 'costs' likely outweighed their benefits in the barren Cycladic islands. Also, suffering from poor and thin soils, the plow would have had only limited impact on productivity. Finally, being very mountainous, steep and rocky, island environments would have been largely inaccessible to cattle and required human labour to cultivate these terrains.

2 It is a commonly expressed notion that Cycladic communities preferred barley over wheat. As wheat requires more rain to grow than barley, the dominance of barley in Cycladic assemblages is considered an adaptation to a lower rainfall regime (Johnson 1996: 284). However, Halstead (2008) has highlighted two problems with these assumptions. The first is that the archaeobotanical evidence that Cycladic sites relied on barley is too slender to be meaningful. Nor is it certain that barley as a crop is indeed less affected by poor soils and limited rainfall

than the glume wheats we know from Neolithic assemblages. A related argument has been proposed for the observed dominance of goat/sheep (80–90%) over cattle and pig in Cycladic faunal assemblages. Ovicaprids, goats in particular, are well known for their indiscriminate browsing habits while cattle and pig have greater demands on fodder and require regular water supply. Given the consistently high ovicaprid count in Cycladic bone assemblages, it is indeed probable that the observed pattern reflects a true adaptation to the drier, less fertile island environment (Johnson 1996).

3 In 1972 Renfrew proposed that the domestication and exploitation of the 'Mediterranean triad', that is wheat, grape vine and olive, allowed the first farmers to diversify their crops and expand agriculture into marginal areas. With different demands on soil, moisture and different growth cycles, this diversification of crops would have created a crop surplus that gave rise to a redistributive authority, ultimately leading to the establishment of the palace societies on Crete and the Greek mainland. Originally considered a persuasive explanatory model for the emergence of stratified societies in the Aegean, investigations into the agricultural technology, archaeobotanical and palynological evidence of the grape vine and olive undermined the veracity of the model.

Many varieties of olives and grape vine exist, and their wild progenitors are endemic to Greece. Although tolerant of temperature and rainfall, these two plant species require more labour for their maintenance than cereals. Also, because they do not bear fruits immediately or, as in the case of the olive, because it only bears fruit every other year, they are a long-term investment. As such, they are not suitable to meet immediate, primary subsistence needs, but may be grown as supplementary crops for exchange (Hamilakis 1999). Hamilakis has summarised the archaeological evidence for Crete (1996; see also Runnels and Hansen 1986): Available in their wild forms, grapes and olives were exploited from Neolithic times. However, archaeological evidence of widespread and systematic exploitation and consumption of wine and olives, in the form of presses or residue in drinking vessels, is only available from the late Middle Bronze Age onwards. The same applies to the discovery of actual olive and vine remains which predominantly date from the (late) Middle Bronze Age. Pollen diagrams confirm that olive and grape were present already in the Early Bronze Age, but are unable to distinguish between wild or domesticated varieties. Literary evidence from Linear B tablets shows that oil and wine was distributed by the Late Bronze Age palaces as rations, offerings or used in perfume manufacture. In sum, none of the evidence available indicates that these crops played any role in the Neolithic colonisation of the Cyclades.

4 Diversification of the food supply, for example by also exploiting wild plants and animals, is one way of mediating potential food shortages. Although there is evidence of the consumption of migratory birds, fallow deer or molluscs as a common way of supplementing dominant food supplies, they only ever form a minor component of archaeobotanical and zooarchaeological assemblages and their dietary contribution always remained modest (Trantalidou 1990) (Figure 4.15). At Ftelia on Mykonos, for example, inhabitants did not use any wild resources and relied exclusively on imported domesticated plants and animals (Phoca-Cosmetatou 2008).

The exception to this rule is fishing which, in the case of Saliagos, was part of the primary subsistence strategy and thus contributed greatly to the inhabitants' diet (Evans and Renfrew 1968).

5 For millennia, animals were killed for their meat. However, this is a wasteful subsistence strategy as it takes time, labour and fodder to replenish the livestock lost. It is only with the 'Secondary Products Revolution' (SPR) that animals were first utilised for their renewable products, such as milk, wool, traction and transport (Sherratt 1981). As Sherratt explains, milk is a rich source of protein. Being a replenishable resource, the calories gained from one animal's milk outweigh those ingested through eating its meat. Wool cannot be utilised as food directly, but can be turned into textiles to be exchanged as and when required. Traction and transport animals could also help indirectly by increasing the fertility of existing land, opening up more land to cultivation or by facilitating exchange. At the time of formulating this theory, little direct bioarchaeological evidence existed. Instead, Sherratt had to draw on indirect evidence, such as iconography, small finds and plough marks. Sherratt recognised that this phenomenon was less like a revolution and more like a slow, gradual adaptation that took hold during the 4th and 3rd millennium BC. He considered the phenomenon to have had important consequences both for plow-using agriculturalists and pastoralists alike (1981). Given the close temporal contemporaneity, scholars later linked the SPR to the colonisation of marginal Aegean island environments.

Since 1981 emerging bioarchaeological evidence has led scholars to backdate the beginnings of the utilisation of secondary products; a comprehensive and current summary of the evidence and critique of the model is provided by Halstead and Isaakikou (2011; also Halstead 2008; Isaakidou 2006). As regards Greece, evidence for targeted milk exploitation is limited. Lipid analysis of clay vessels demonstrates that milk was already being processed by the late 6th millennium BC and thus is unrelated to the 4th millennium explansion of settlements onto islands. Drawing on case studies from non-industrialised settings, the authors highlight that intensive milk production is surprisingly high in labour costs for herding, milking and milk-processing, and thus beyond the scope of small island village populations. Direct evidence of Neolithic textile production is missing, but the decorated figurines suggest that textiles already played an important role well before the supposed watershed. More importantly, analysis of the slaughter patterns of sheep and goat at various island sites shows that the majority of animals were killed as juveniles or young adults – a kill pattern typical of a meat strategy. While some utilisation of wool and milk cannot be excluded, there is no evidence of intensive exploitation of the secondary products. The current evidence is unaminous: the SPR, as envisaged by Sherratt in 1981, did not occur in the 4th/3rd millennium BC and was unrelated to the expansion of settlements into the Aegean Islands.

At the moment, we lack convincing explanations as to why the Cyclades were first settled in the later Neolithic or what the underlying motivations were for this expansion. Reasons linked to agricultural

developments or food resources have been shown by Halstead (2008) to be inadequate models. Likewise, the assumption that raw material resources invited colonisation has been shown to be flawed as neither Melos (obsidan) nor Siphnos (metals) were among the earliest islands to be colonised (Brookbank 2000a: 127–128). While the colonisers' motivations elude us at this point in time, Broodbank (2000a) has argued that we may be able to recreate their journey by investigating the site distribution patterns: assuming that colonisers would make progressively greater journeys into the island world, one would expect a gradual infilling of the Cyclades from the mainland. If correct, this model would show that the earliest settlements can be found on islands closest to the mainland. In reality, however, the evidence shows that 'Saliagos culture' sites represent the earliest known colonisation episodes in the Cyclades and their distribution is focused on the southeast Cyclades (Mykonos, Naxos, Paros, Amorgos, Thera). Two primary routes into this region exist: from the Greek mainland via stepping-stone islands (Attica-Kea-Kythnos-Seriphos-Siphnos or Euboia-Andros-Tenos-Mykonos) or from the Dodecanese (Samos-Ikaria-Naxos or Kos-Astypalaia-Amorgos). The lack of contemporary sites in the northern and western Cyclades makes the first route unlikely. In contrast, dozens of Late Neolithic sites are known from the Dodecanese and, while the actual distances between islands are greater, Naxos and Amorgos represent accessible and visible targets. Broodbank thus argues that the Saliagos sites are extensions of the Dodecanesian colonisation. He attributes their relatively short life-span either to the vagaries of maintaining a viable human population density or a retreat of settlers back to the Dodecanese (Broodbank 2000a: 126–143).

Suffice it to say, the early prehistory of the Aegean islands is at a major crossroads. With ever more sites being uncovered, our understanding of island communities is changing rapidly. Two and a half decades ago the available evidence suggested that the dominant period of island colonisation was the Early Bronze Age (Cherry 1990). Thanks to further excavations and targeted surveys, we are now aware that it was actually during the Late or Final Neolithic that many islands were settled first (Dawson 2014). Finds from the earlier phases of the Neolithic are, as yet, rare, especially in the Southern Aegean, but the presence of Mesolithic island sites makes Early and Middle Neolithic habitation in the Cyclades likely (Efstratiou 2008). Finding these sites is our next great challenge.

5

THE INTERNATIONAL ISLANDS

The Early Bronze Age

CHRONOLOGY

The chronology of the Early Bronze Age has long been debated. Not only do different geographical regions have their own chronological nomenclatures, but different chronological schemes compete with each other *within* each region. At the same time, relationships between these schemes and site stratigraphies are not always straight-forward (Figure 5.1). Luckily, the increasing availability of radiocarbon dates is beginning to provide an anchor to help fix regional and local chronologies.

The most commonly used chronological scheme was set out in detail by Renfrew (1972) who divided the Early Bronze Age into culture periods based on shared pottery shapes and wares. This chronology was created with reference to the Cyclades, although it is also commonly referred to when discussing contacts between the Cyclades and other regions. The cultures were named after characteristic site assemblages. The following are still recognised as viable categories: Grotta-Pelos culture, Kampos Group, Keros-Syros culture, Kastri Group, and Phylakopi I culture (for a recent assessment of the validity of these culture-chronological categories, see Rambach 2000).

Dates	Periods	Culture names
3,200–3,000 BC	EC I	Grotta-Pelos culture
3,000–2,800 BC	EC I/II	Kampos Group
2,800–2,500 BC	EC II	Keros-Syros culture
2,500–2,200 BC	EC II/EC III	Kastri Group
2,200–ca. 2,000/1,900 BC	EC III late/early MBA	Phylakopi I culture

Figure 5.1 The Cycladic Bronze Age chronological systems (based on dates from Markiani, Amorgos, with additions).

The second chronology, also developed with reference to the Cyclades, is in the form of a tripartite scheme that replicates the Greek mainland and Cretan chronologies by dividing the islands' Early Bronze Age period into three phases: Early Cycladic I, Early Cycladic II and Early Cycladic III (e.g. MacGillivray and Barber 1984). This scheme is used alongside the more popular culture-historic terminology. It is now seeing a revival and many scholars are providing both nomenclatures. The tripartite scheme is particularly favoured by scholars who work in the northeast Aegean and have to make reference to an analogous relative Anatolian chronology.

Absolute radiocarbon dates are still relatively infrequent. The best sequence comes from Markiani on Amorgos which has a continuous habitation sequence throughout much of the Early Bronze Age (Marangou et al. 2006). The dates are as follows: ca. 3,200–3,000 BC for the Grotta-Pelos culture, 3,000–2,800 BC for the Kampos Group, 2,800–2,500 BC for the Keros-Syros culture, and 2,500–2,200 BC for the Kastri Group. The settlement was subsequently abandoned and never reoccupied. Further radiocarbon dates have been determined for Dhaskalio, an islet off Keros, which are in broad agreement with those from Markiani: the start of the Keros-Syros culture is dated to 2,750 BC, the transition from the Keros-Syros culture to the Kastri Group took place around 2,550 BC and the end of the Kastri Group falls around 2,400 BC (Renfrew et al. 2012).

Evidence for the final phase within the Early Bronze Age, the so-called Phylakopi I culture or EC III, is so rare that it has given rise to the assumption that there was a hiatus of 150 years in the occupation of the Cyclades until reoccupation of the islands in the Middle Bronze Age. Rutter (1983) was the first to put forward the hypothesis of a 'gap' by pointing to a jump in the stratigraphic sequence of Ayia Irini on Kea. This hiatus showed that the site had been abandoned after the end of Period III (= Kastri Group) and was only reoccupied in the Middle Bronze Age, Period IV, with a different material repertoire. Intriguingly, this gap in the archaeological record seemed to occur across the entire Cyclades and Rutter was unable to locate a single site that showed conclusive evidence of habitation during or across this period. It was not only material culture that changed between these two periods. Scholars have also pointed to the loss of longboat-based networks, the arrival of the sailing boat and a trend away from dispersed small sites towards nucleated settlements (Broodbank 2013).

Since Rutter formulated his hypothesis in the 1980s, new evidence has come to light that is beginning to close this 'gap' (for a summary of the debate and the recent evidence, see *American Journal of Archaeology* 2013 'Minding the gap' volume). There is now evidence of EC III pottery, for example, from Rivari on Melos that dates the cemetery to EC II–III. A Cycladic jug from Palamari on Skyros and one jar from Early Minoan III Knossos, Crete, indicate that pottery was being produced in the Cyclades during this period. Likewise, excavations at Akrotiri on Thera have brought to light a sealed pottery assemblage that contained vessel forms from both the Kastri phase (late EC II) and Phylakopi I–ii (MBA) cultures (Sotirakopoulou 1996, 2008). This co-occurrence of wares supposedly separated by several centuries demonstrates the contemporaneity, or at least partial overlap, of these two cultural phases, and indicates that any interruption to habitation, if it existed at all, may have been very short lived. Most convincing, however, is the unbroken radiocarbon sequence from Dhaskalio which dates from the Keros-Syros culture to the Phylakopi I culture and shows considerable continuity between the layers (Renfrew et al. 2012). Continuous occupation would also concur with evidence from Crete and

the northeast Aegean where no such hiatus has been observed and where life continued uninterrupted throughout the Early Bronze Age (Brogan 2013; Kouka 2013).

SETTLEMENT PATTERN

Settlement-cemetery pairs represent the typical habitation pattern in the Early Bronze Age Cyclades (Figure 5.2). While many cemeteries have been identified and excavated, knowledge of settlements is incomplete. Surveys of Melos, Naxos and Andros revealed a generally 'dispersed' site distribution, with small habitation sites scattered around each island, often located on promontories overlooking the sea and in close proximity to good harbours and fertile hinterland. Each site probably functioned as an

Figure 5.2 Key sites in the Early Bronze Age Aegean.

independent and self-sufficient economic unit and may have supported an extended family or kin group. Wagstaff and Cherry (1982: 137–138), for example, estimate that Melos had as many as 35 small, dispersed settlements during the Early Cycladic I period, rising to 45 in Early Cycladic II and declining to 25 in Early Cycladic III as nucleation of population became more prominent. Population density would have been low and unlikely to supersede 500 inhabitants during the Early Bronze Age. The island of Kea is the exception as no dispersed habitation pattern was observed. Instead, Ayia Irini appears to have been the only significant settlement on the island during the Early Bronze Age (Cherry et al. 1991).

A slow but continuous progression towards a nucleated settlement pattern, signified by larger villages with substantial building remains and often located near the sea with good harbour access, is visible at Markiani on Amorgos, Grotta on Naxos, Paroikia on Paros and Skarkos on Ios from EC II onwards.

At the end of the Early Cycladic II period (Kastri Group), we observe the short-lived appearance of small fortified sites on hilltops near the sea, such as Panormos on Naxos, Kastri on Syros and Palamari on Skyros. The existence of fortifications and hundreds of sling shots may hint at a period of unrest during this phase.

Evidence of Early Cycladic III is sparse and most of our knowledge comes from the settlements at Paroikia on Paros, Akrotiri on Thera and, particularly, Phylakopi on Melos. Smaller sites are Mikre Vigla on Naxos, Plaka on Andros, Kastri on Siphnos and Dhaskalio off Keros. However fragmentary, the evidence suggests that these settlements were larger and more substantial than the villages of the preceding phase and highlights a major change in the settlement pattern: the trend towards nucleation that began in the Early Bronze Age II period was now completed. However, the results of the Melos Survey indicate that this nucleation was not exclusive and some small sites continued to exist outside the large, proto-urban central settlements (Wagstaff and Cherry 1982: 138).

Broodbank (2000a: 341–349) regards the emergence of the sailing boat as a major contributor to this dramatic change. He argues that this new, fast, cargo-carrying boat type required the use of a harbour and could not be simply pulled up on the beach as dugouts or longboats could. This requirement resulted in a relocation of population close to suitable harbour locations, such as the deep harbours found near Phylakopi, Paroikia and Akrotiri.

The situation is rather different in the northeastern Aegean islands where urban development begins without delay at the start of the Early Bronze Age. While we can also observe a dispersed settlement pattern with many small, self-sufficient sites located close to marine and agricultural resources, the difference is that on each island one dominant settlement emerged already in the Early Bronze Age I period as the primary centre. These centres are distinguished by their size (2 ha or bigger), complexity in layout, organisation and quality and quantity of small finds. The dominant settlements are Poliochni on Lemnos, Thermi on Lesbos, Emborio on Chios and the Heraion on Samos.

TOWN PLANNING AND ARCHITECTURE

Northeast Aegean settlements have provided much information on town planning, house architecture and infrastructure. In contrast, Cycladic evidence is limited as the majority of investigated sites are

cemeteries. Markiani on Amorgos, Koukounaries on Paros and Kastri on Syros provide most of our information. Soundings at Akrotiri on Thera have brought to light much pottery, but are sparse in architectural features. Ayia Irini on Kea and Skarkos on Ios will contribute greatly to our knowledge but are not yet fully published.

What we do know of Cycladic settlements is that some of them were substantial towns that reached up to 1 ha in size (e.g. Ayia Irini on Kea and Skarkos on Ios). A more complete picture is available for the northeast Aegean. Towns were up to 2 ha in size and showed strong evidence of settlement organisation.

Aegean settlements consist of an agglomeration of houses (independent or joined building complexes, so-called *insulae*) that are intersected by streets, public squares and may be surrounded by a fortification wall. Four distinct layouts have been recognised archaeologically: irregular, radiating, orthogonal and linear designs. In the radiating layout, streets radiate outwards from the settlement centre and are intersected at intervals by concentric roads (e.g. Thermi I–IIIA, Heraion, Kolonna V). The orthogonal street design is characterised by streets that meet at approximate right angles, thus creating the grid-like system known from Thermi IVA–B and Manika on Euboia. The linear street plan creates a central avenue along which all key buildings are located; side roads branch off the central road (e.g. Poliochni, Thermi V). Finally, the category of 'irregular street layout' encompasses all street plans that do not fit the criteria of radiating, orthogonal or linear designs (Alram-Stern 2004).

House walls were normally built of locally available stone, or possibly with upper structures made of mud bricks and timber. Roofs were generally flat and made of timber and mud or flat schist slabs. Houses are classified into four common types: 1) one-roomed or multi-roomed rectangular houses; 2) one-roomed or multi-roomed apsidal houses; 3) courtyard-centred buildings; and 4) circular houses (Leiner 2011; Alram-Stern 2004).

Circular buildings are very rare – the only known example in the islands is found at Phtellos on Thera. Courtyard-centred buildings are widely represented in the Aegean islands (e.g. Poliochni, Koukounaries). Irregularly shaped rooms were grouped around a courtyard. The building was normally closed off to the street and the entrance to these house complexes was through the yard. They are interpreted as family residences.

Apsidal buildings are almost always free-standing. The building type has its roots in the Final Neolithic where they can be found both in the north and south of the Greek mainland. In the islands, however, they make their first appearance in the northeast Aegean (e.g. Poliochni) in Early Bronze Age I before spreading southwards. In Early Bronze Age II, examples are attested at Pyrgos and Paroikia on Paros, Mt Kynthos on Delos, Panormos and Korfi t'Aroniou on Naxos, Skala Sotiros on Thasos and Poliochni on Lemnos. By the end of the Early Bronze Age, they have become the most popular house type in the Peloponnese. Based on the small finds and interior furnishings, they are normally interpreted as residential buildings and storage facilities.

By far the most common building type across the Aegean is the rectangular house. Its sub-types include the megaron, the so-called long-house, and the corridor house. The megaron, or megaroid building, consists of one or two rooms with the central hearth. Set in front is an open anteroom. These megara are normally independent structures (e.g. Poliochni Building 317, 832), though they can also form part of larger structures (e.g. Kolonna on Aegina).

Long-houses consist of one long room, or they may consist of a long main room with an anteroom set in front. This type is particularly common in the northeastern Aegean. They may stand as individual houses (e.g. Poliochni and Myrina on Lemnos, Emborio on Chios, Serraglio on Kos, Heraion on Samos, Asomatos on Rhodes) or they can form part of a row of houses characterised by shared walls (e.g. Thermi on Lesbos).

The third sub-type of rectangular houses is the so-called corridor house which became particularly popular on the Greek mainland in the Early Bronze Age II period. Corridor houses have been found at Kolonna on Aegina, Lerna, Akovitika, Thebes, Zygouries, Tiryns, Eutresis, Manika, Liman Tepe in Anatolia and Palamari on Skyros. A free-standing building, its distinct rectangular architecture consists of a linear sequence of rooms flanked along the long sides by narrow corridors which may be subdivided. A staircase leads to a first floor. Most of the buildings were roofed with tiles. They are generally regarded as either elite residences or public buildings (Shaw 1987).

SPECIAL-PURPOSE ARCHITECTURE: FORTIFICATIONS, GRANARIES, ELITE RESIDENCES, MEETING HALLS, DRAINAGE SYSTEMS

For a long time scholars believed that fortifications first appeared in the Early Bronze Age. However, the existence of Neolithic fortifications, for example at Strofilas on Andros and Emborio on Chios, make it clear that this island tradition goes much further back in time. Early Bronze Age I stone-built fortifications have been found at Markiani on Amorgos, Poliochni on Lemnos, Thermi on Lesbos, Emborio on Chios, and the Heraion on Samos. Fortifications became even more widespread in the Early Bronze Age II period when they are found also at Palamari on Skyros, Kastri on Syros, Panormos on Naxos, Kolonna on Aegina, Mt Kynthos on Delos, Skala Sotiros on Thasos and Liman Tepe on the Anatolian coast (Renfrew 1972; Aslanis 2008). Fortifications normally consisted of high walls (single, double or even triple as in Kastri’s case) and substantial gates. As one would expect, fortifications were frequently extended or modified over time; a particular feature of the Early Bronze Age II period is the addition of multiple horseshoe-shaped bastions. Fortifications are rare in the Early Bronze Age III period. Some, however, continue in use, such as those at Kolonna, Poliochni (Yellow) and Thermi IVb.

Well understood is the fortification at Palamari which was built in the Early Bronze Age I period and continued into the Middle Bronze Age (Figure 5.3). However, its main phase of use belongs to the Kastri Group, and it shares many characteristics with Kastri on Syros. Fortification walls are clearly visible in the northwest and southeast of the settlement and extended around the entire settlement and harbour. The settlement was unprotected towards the sea: at least eight horseshoe-shaped bastions were located at irregular intervals alongside the fortification wall. A smaller external wall, together with a 2 m deep and 5 m wide ditch, provided additional protection against attacks. The fortification was an impressive structure. The bastions survived up to 5 m in height and the largest measured 9 x 9 m in plan (Alram-Stern 2004: 730).

Of smaller scale is Panormos on Naxos (Figure 5.4). Twenty small, irregularly built rooms are enclosed by a fortification wall. The wall encircles the hill and is reinforced by five horseshoe-shaped

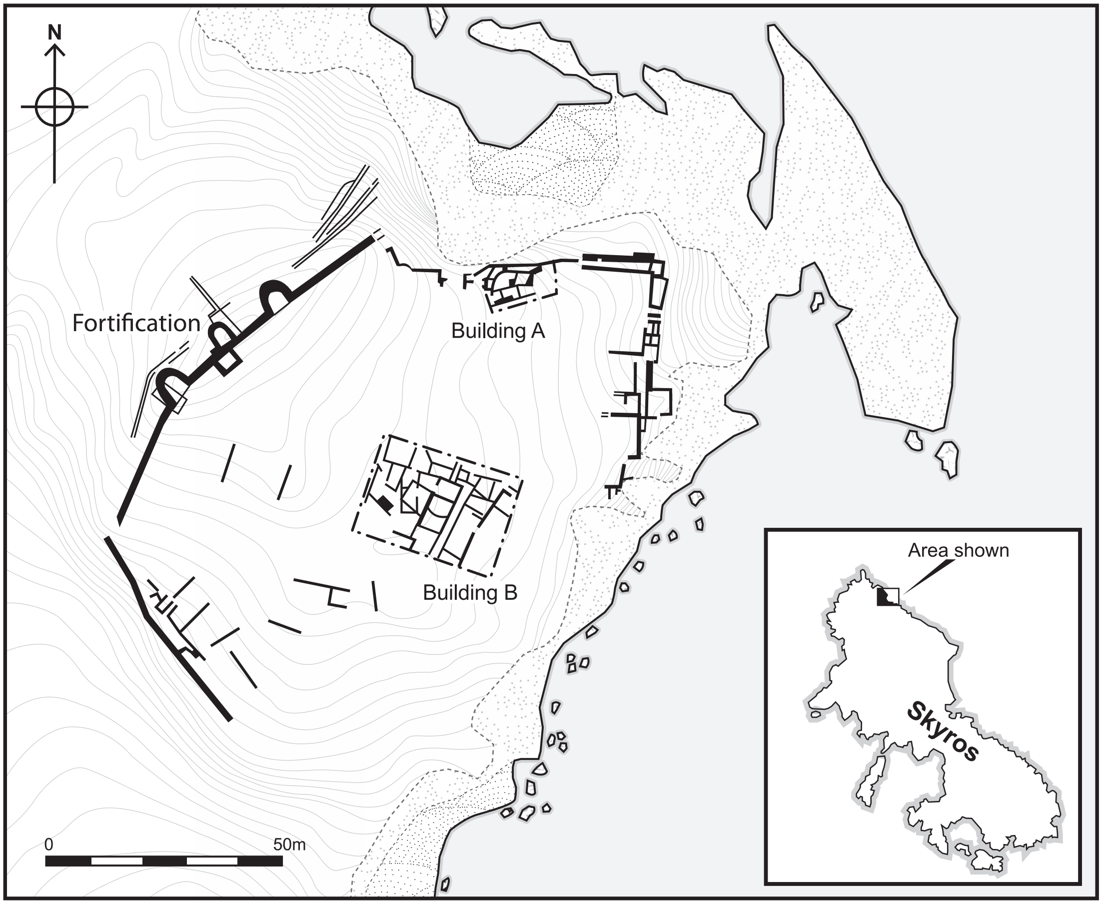


Figure 5.3 Palamari on Skyros (after Theochari et al. 1993; Alram-Stern 2004: Fig. 49).

bastions. Two of these protect the narrow entrance passage. The site was destroyed by fire, most likely a consequence of an attack. Of particular interest are the numerous sea pebbles that have been discovered from two of the bastions – they may have served as sling shots. Originally regarded as a fortified settlement, the limited selection of finds and small number of rooms have now been reinterpreted as a single fortified storage building where islanders had sought refuge (Angelopoulou 2008: 151).

Households themselves were normally in charge of organising their own food supplies. Large storage jars were the most common private food storage facility and helped safeguard a family against minor seasonal fluctuations in the food supply. However, communal storage facilities also existed in some towns and were first recognised in the northeast Aegean in the Early Bronze Age I period. Poliochni boasts communal storage facilities in Buildings 28 and 31 (Figure 5.5). A large building with similar function is also attested at the Heraion. Interestingly, when Poliochni's communal storage buildings went out of use in the Red Phase, families reverted to a decentralised mode of food storage (Kouka 2008).

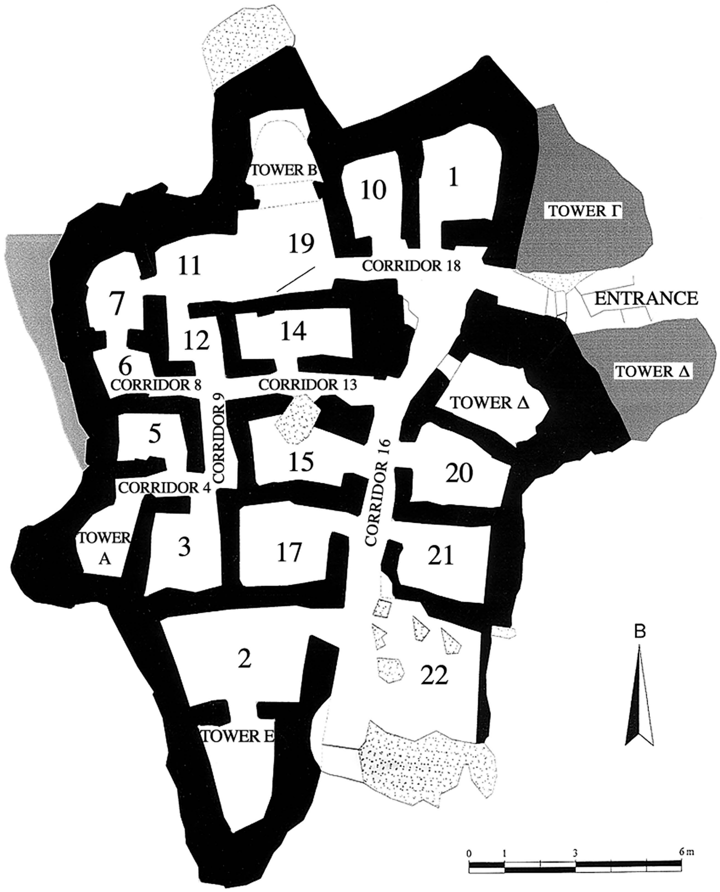


Figure 5.4 Ground plan of the fortified building at Panormos on Naxos (Angelopoulou 2008: Fig. 16.1). With permission from A. Angelopoulou. Image courtesy of the McDonald Institute of Archaeological Research.

Another communal structure, possibly linked to administrative activities, is the so-called Bouleuterion (Building 14) at Poliochni. Equipped with benches for about 50 people, it has been interpreted by the excavators as a communal meeting room. On the Greek mainland, the so-called corridor houses may have played a similar role (Kouka 2008).

Public water supply and waste water installations are part of the townscape already in the Early Bronze Age. These installations include fountains in public squares (Poliochni on Lemnos, Thermi on Lesbos, Emborio on Chios, Ayia Irini on Kea), complex drainage systems for channelling rain water away from squares, courtyards, streets and roofs (Poliochni on Lemnos, Markiani on Amorgos, Palamari on Skyros, Skarkos on Ios, Ayia Irini on Kea). The earliest examples can be found in the northeastern Aegean from Early Bronze Age I onwards, and other regions followed suit in Early Bronze Age II.

Research into settlement organisation also allows insights into the often associated phenomena of urbanisation and the emergence of social stratification. The large-scale excavations undertaken on the northeast Aegean islands have firmly established the urban character of Poliochni, Thermi, Emborio and

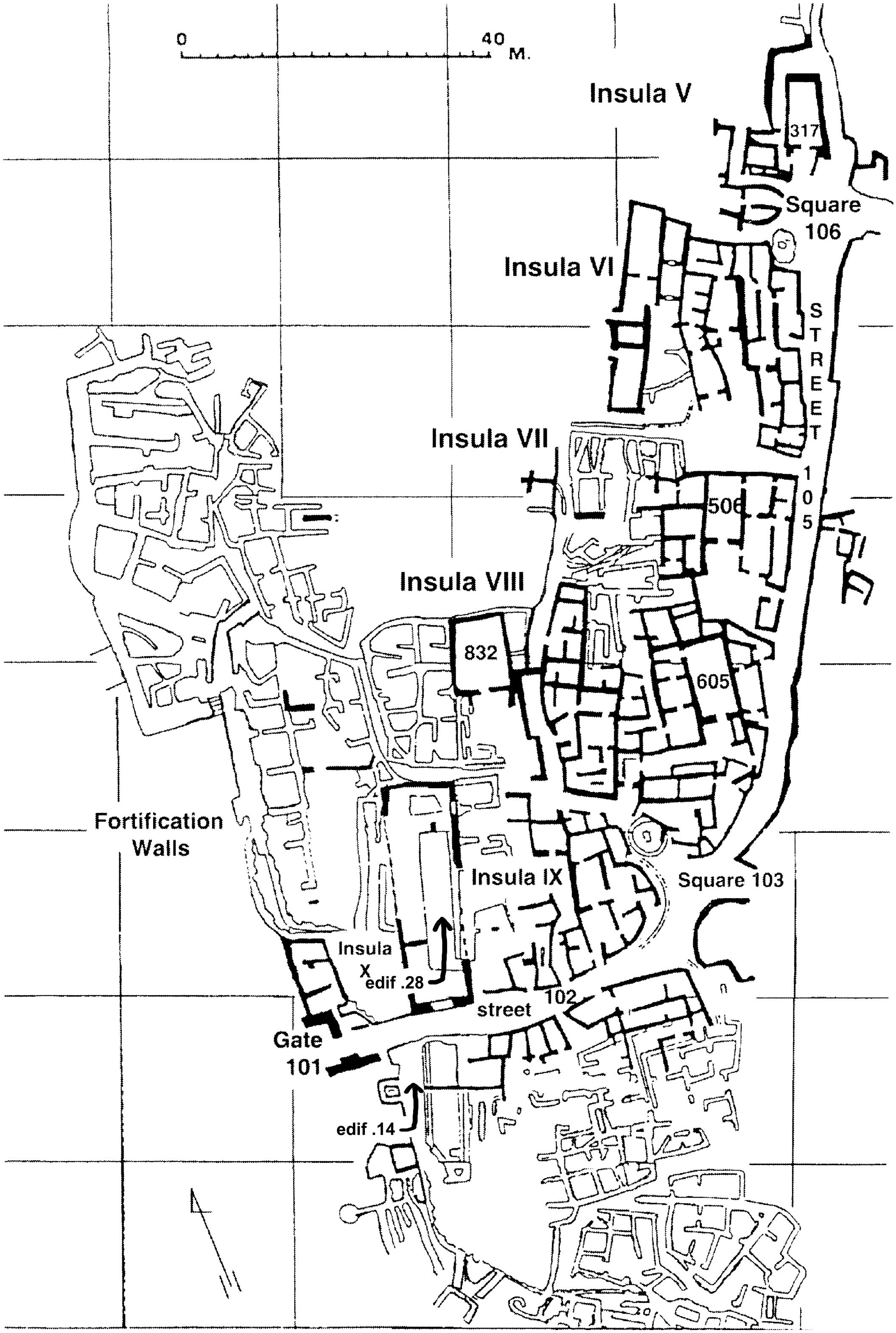


Figure 5.5 Plan of Poliochni (Yellow). Image courtesy of M. Cultraro (with additions).

the Heraion – even when compared with large urban centres in Anatolia (Kouka 2002). Scholars have drawn attention to the existence of social hierarchies (e.g. differences in house sizes), political elites (e.g. elite residences), craft specialisation, international trade links (especially in relation to metallurgy), record-keeping (e.g. seals), substantial settlement size, settlement planning (e.g. street systems, *insulae*, public squares, wells, drainage), special-purpose buildings (e.g. communal halls, storage buildings) and fortification systems (Alram-Stern 2004; Kouka 2002).

The situation in the Cyclades is less clear as incomplete excavations and publications make an assessment of the preceding features problematic. Until very recently, there was little evidence to support the existence of urban settlements or social stratification and scholars preferred to assign settlement planning to communal enterprise under the leadership of a strong individual with temporarily assigned authority (Broodbank 2000a). However, an analysis of grave practices at Chalandriani cemetery on Syros by Hekman (2003) may support an argument for powerful clan chiefs and distinguished leading families. In addition, excavations at Skarkos on Ios and Ayia Irini on Kea have provided evidence that sites with clear urban characteristics, such as town planning, two-storey houses, rain-water disposal, sewage system and access to imports, also existed in the Cyclades. It is thus likely that the current view of the Cyclades as less complex and less urbanised than the northeastern Aegean islands is based on excavation bias rather than reality. The same appears to apply to the Sporades where Palamari on Skyros has been recognised as an urban centre.

DIET

Dietary habits did not change fundamentally between the Neolithic and the Early Bronze Age. What evidence we have suggests subsistence based on agriculture and animal husbandry. Bone assemblages show that sheep and goat continue to dominate, followed by pig. Cattle are present, but only make up a small percentage of the animal bones. Evidence of hunting of wild animals is sparse. Fishing is rare, but the gathering of limpets from the rocky shores appears to have been a common activity.

Barley, emmer, pea, bitter vetch, Spanish vetchling and almonds are plants commonly found at Early Bronze Age sites (J. Renfrew 2006). Frequent discoveries of stone querns provide additional indirect evidence of agricultural production. Settlers began to manage and cultivate olive trees and their fruits from the Early Bronze Age onwards, if not the Neolithic. The mention of olive and olive oil in both Linear A and Linear B tablets suggests that extensive exploitation began in the Middle Bronze Age and increased into the Late Bronze Age. Less controversial is the domestication of the vine. Evidence from Ayios Kosmas on the Greek mainland, Myrtos on Crete and the common occurrence of vine leaf impressions on the bases of clay vessels in the Cyclades makes it likely that the grape had been successfully domesticated by the Early Bronze Age (Runnels and Hansen 1986; Hamilakis 1996; Margaritis 2013).

CEMETERIES

Much of our knowledge about the cemeteries comes from the Cyclades (Doumas 1977; Rambach 2000). Built of stone and grouped into clusters, tombs survive well and are readily visible (Figure 5.6).

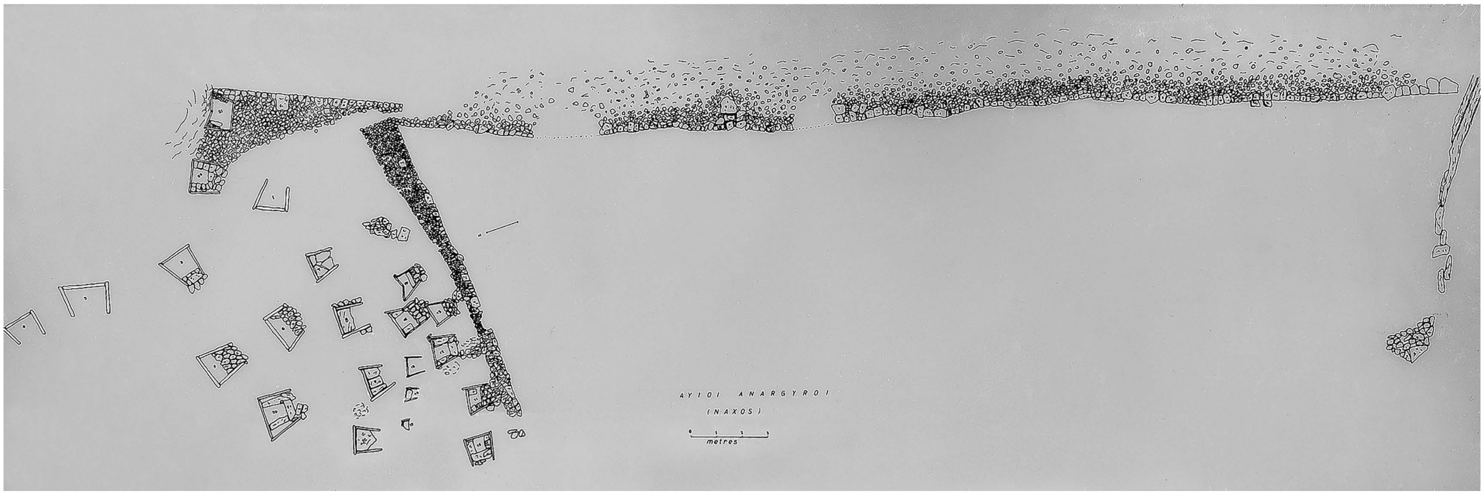


Figure 5.6 Plan of the EC II Ayioi Anargyroi cemetery on Naxos (after Doumas 1977: Fig. 17). With permission from C. Doumas.

Unfortunately, these very characteristics have also been to their detriment. As islanders buried their dead with grave goods, looters frequently targeted these tombs in the past and continue to do so.

In the Early Cycladic I period there is plentiful evidence of cemeteries on the islands (e.g. Melos, Naxos and Paros) with multiple cemetery clusters per island common. Each cemetery cluster was located on a slope, often near the coast, and contained 10–15 cist graves that served as the resting place for one individual inhumation each. Although few settlements are known from this period, scholars believe that each cemetery was associated with a settlement. If this assumption is correct, then each cemetery served only a small community of people – perhaps 10–15 individuals – such as an extended family that lived in a farmstead.

The most common Cycladic tomb type in the Early Bronze Age is the cist tomb which Doumas (1977) has classified into several sub-categories based on their construction design and shape (Figure 5.7). In the Early Cycladic I period, cists are simple pits dug into the ground and lined with stone slabs on all sides (Type A according to Doumas' typology). Pebbles often formed the floor and sometimes a long stone slab acted as a 'pillow' for the deceased. The grave was capped with a slab or stones which, topped with additional stone-settings, created platforms. Shape differed, but was most commonly trapezoidal. The tombs were generally small and varied in dimensions (ca. 0.8–1.2 m in length, 0.3–0.8 m in width and 0.3–0.6 m in depth). Each cist grave contained the remains of a single inhumation in strongly contracted position with the head facing away from the hill towards the open horizon. The deceased was normally placed on his or her right-hand side, with knees tightly bent and hands positioned in front of their face. Grave goods accompanied the dead and were often deposited in front of the deceased's face (Figure 5.8). They appear to have been personal belongings, such as jewellery, vessels or tools. The unplundered Grave 21 from the cemetery of Akrotiri on Naxos, for example, contained two clay pyxides, one clay collared jar, one marble figurine, two marble pestles, one stone mortar with traces of red pigment and one stone necklace. Funerary or commemorative rituals may have been enacted at a stone platform next to the cemetery. Cemeteries of this period are Lakkoudes and Akrotiri on Naxos, Plastiras on Paros and Kalogries on Melos.

Ayioi Anargyroi (Figure 5.6) and Tsikniades on Naxos and Agrilia on Ano Kouphonisi are cemeteries of the ECI/II transitional phase (Kampos Group). The cist remains the most popular tomb type – either with all four walls made up of slabs or one made of dry-stone walling to facilitate re-opening (Doumas Types A and B1). Graves were trapezoidal in plan and were located on a steep slope. Graves were no longer built in clusters, nor were they reserved for individual burial. Instead, we can observe the use of each tomb for multiple burials (in some cases more than 20 inhumations). Scholars have linked this change towards larger cemeteries and multiple inhumations with the gradual abandonment of isolated farmsteads and the emergence of larger hamlets which brought together larger families or even kin groups.

The cemetery of Agrilia on Ano Kouphonisi, one of the smaller islands within the Cyclades, is unique (Zapheiropoulou 2008). With at least 92 graves it probably constitutes the second largest cemetery in the Cyclades. Tombs were cut into the soft rock and consist of a roofed funerary chamber and a sunken trapezoidal or oval forecourt for funerary offerings with a large upright slab blocking off the entrance to the chamber. This tomb type is entirely alien to the Cyclades. The deceased were laid

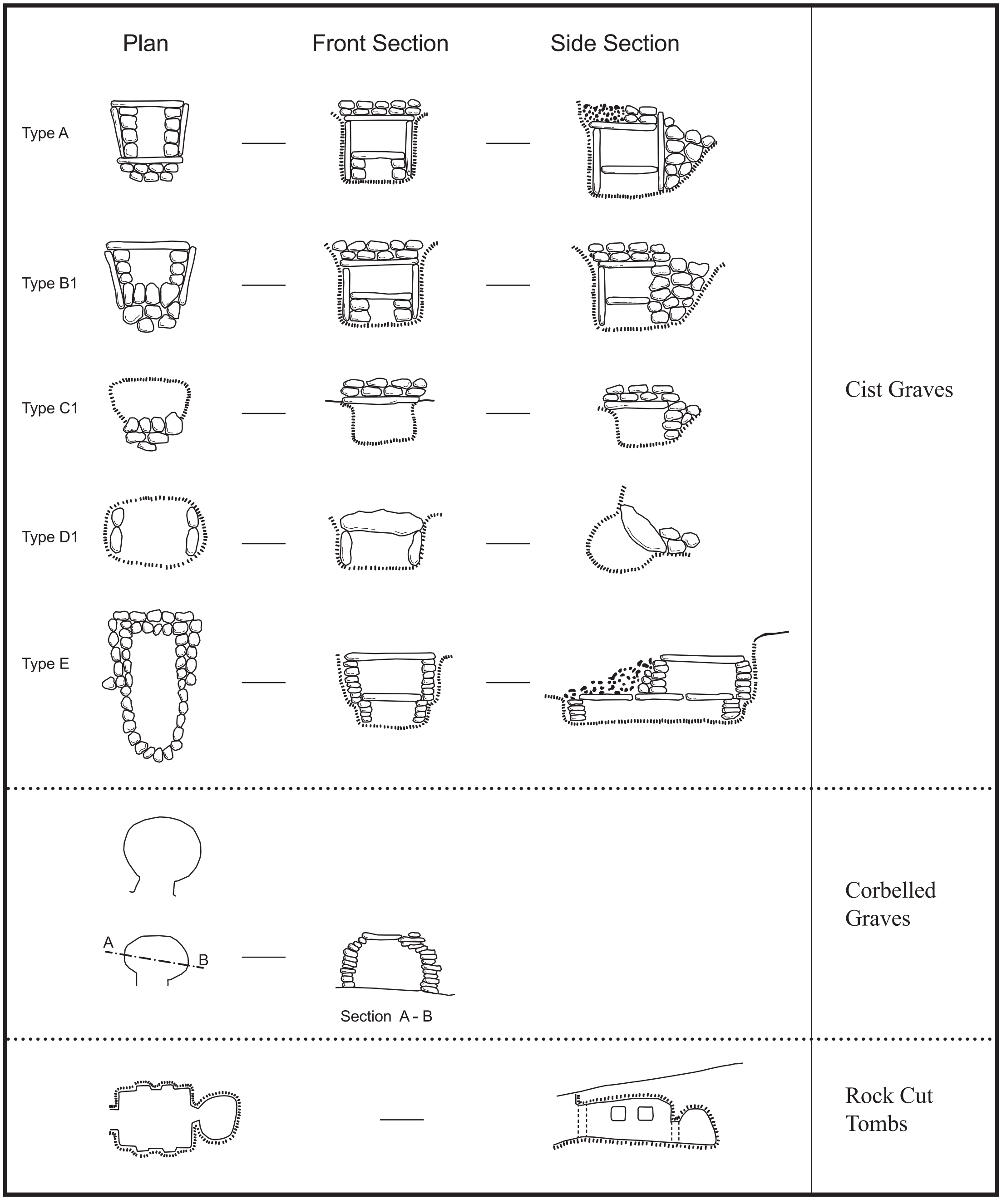


Figure 5.7 Early Bronze tomb types (after Doumas 1977): a) cist graves, b) corbelled graves, c) rock-cut tombs).

Figure 5.8 Tomb 19 at Lakkoudhes cemetery on Naxos. Unplundered grave with a skeleton placed on its right-hand side in a contracted position and a clay vase in front of the skull (Doumas 1977: Plate IIIg). With permission from C. Doumas.

out in a contracted position and with their faces pointing towards the grave entrance. Grave goods accompanied the dead. They included obsidian, bronze needles, sea shells, clay pots and marble vessels. Displaying pure Kampos Group material, the cemetery was probably in use only for a short time, three–four generations at most. Scholars have sought to explain the size and uniqueness of the cemetery by pointing towards Ano Kouphonisi's central location along sea routes connecting the large northeastern Aegean towns with the northern coast of Crete (Zapheiropoulou 2008: 192). Based on the startling similarities between the tomb architecture at Agrilia and Ayia Photia on Crete, scholars have argued that islanders from Ano Kouphonisi settled on the north coast of Crete (Betancourt 2008; Broodbank 2000a: 302–303).

During the Early Cycladic II period, burial habits appear to have been shared across all the islands with the exception of Chalandriani on Syros. Generally speaking, cemeteries were considerably larger than in the preceding phase (now containing more than 50 graves) and many islands had multiple cemetery clusters. Cist tombs continue into the Early Cycladic II period, but now can have as many as three 'storeys' and are used for multiple burials (instances with more than 20 burials have been observed). Most of the architectural features of cists remained consistent over time except that one or more walls were now constructed of dry-stone walling rather than a stone slab (Doumas Type B1 and B2). Scholars have speculated that this enabled the re-opening of the grave and the insertion of a newly deceased body. In the case of multiple compartments, the lower one acted as an ossuary and received the remains of previous burials. Interestingly, skulls were almost never removed from their primary location. Grave goods accompanied the deceased and probably represented their personal belongings. The majority of tombs was small, but some are distinguished by their comparatively large size, quality of construction and location (Barber 1987; Doumas 1977). The tradition of building a platform next to the cemetery, most likely to act as a place for ritual and commemoration, continues from the Early Cycladic I period.

The cemetery of Chalandriani on Syros also falls into the Early Cycladic II period, but is unique in size, wealth and tomb types (Tsountas 1899; rescue excavations by the Greek Archaeological Service in 2002–2008 have revealed a further 28 graves). With over 700 tombs it represents the largest cemetery in the Cyclades (Figure 5.9). The cemetery was in use for 300–400 years and served a settlement of about 75–100 people. It was organised into several clusters located on steep slopes. Round or rectangular graves were dug into the ground, stone-lined and then covered with a corbelled roof. The roof was closed with a capstone (Figure 5.10). Graves varied between 0.6 and 1.6 m in length. A small (0.5–0.6 m) doorway with a threshold and small entrance passage is present. In some instances, a large slab blocked off the doorway. The majority of graves contained a single, contracted inhumation together with accompanying grave goods. Only nine tombs held two or three persons. Unfortunately, none of the skeletal remains have been preserved. Grave furnishings include 'pillow' slabs and small wall niches for offerings. Ceramics were the most common grave good (50%), followed by metal artefacts (15%) and stone vases (14%). Bone tools, obsidian blades, shells, marble figurines, tools, pins and jewellery are represented only occasionally (Figure 5.11).

A recent analysis by Hekman (2003) of the Chalandriani tombs has revealed dramatic variation that supports the supposition of social differences among the community members: 75% of the tombs have one to three grave goods, 15% have four to six objects, 9% have between seven and 15 items, and 1% have 17–29 artefacts. While the artefact types found in poor graves are the same as those in rich ones, they are present in much smaller numbers. Metal objects, stone figurines and shell, on the other hand, seem to be exclusive to rich tombs. The specific selection of grave good types, however, is not standardised and varies from individual to individual; in fact, Hekman speculates that it may represent a person's individuality, such as their position in society, age, gender, profession or family association (2003: 191). Based on cluster analysis, he suggested that burials with the very largest grave good assemblages belong to community leaders, while those with large inventories were assigned to heads of families.

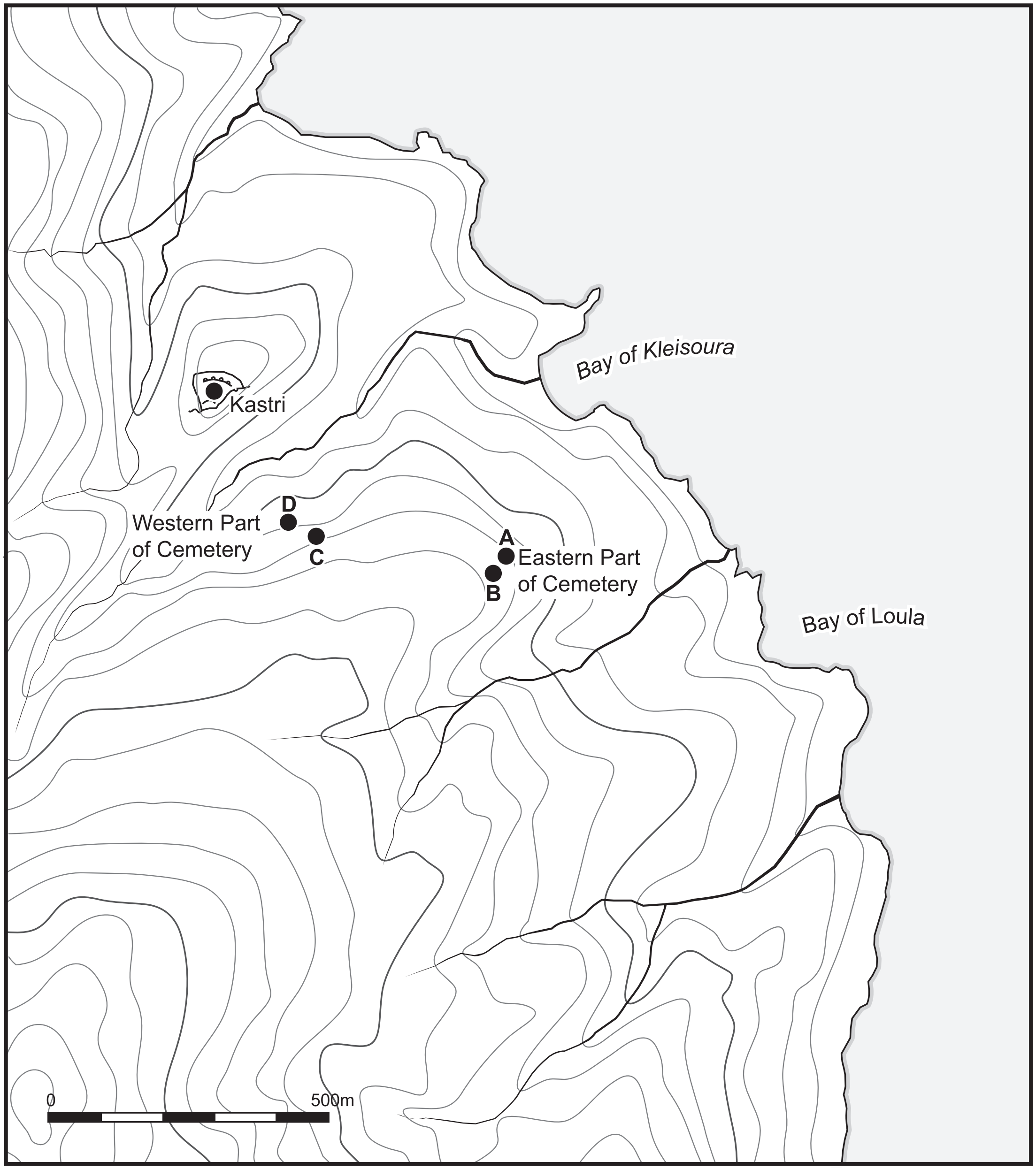


Figure 5.9 Map of the cemetery at Chalandriani on Syros (after Hekman 2003: Fig. 13).

Hekman's attribution of round graves to women and rectangular tombs to men is based on artefact types (pans, stone palettes, pestles and metal tools, shell necklace, stone figurine respectively), not skeletal analysis, and is thus unsubstantiated.

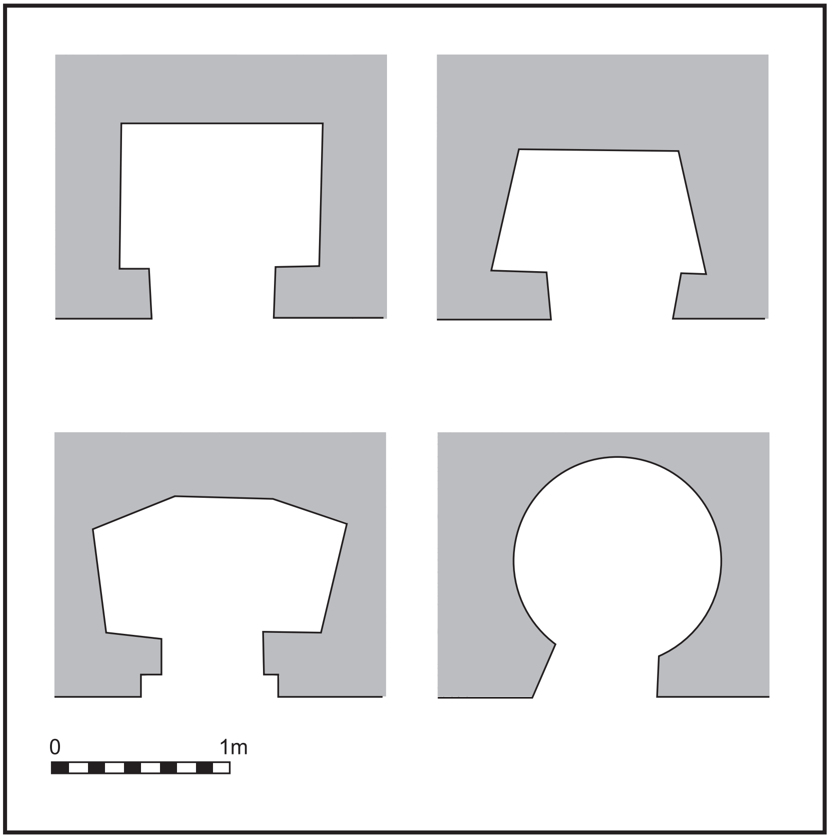


Figure 5.10 A selection of tomb plans from the Chalandriani cemetery (after Tsountas 1899).

Little is known about the cemeteries during the Early Cycladic III period. Most of what we know comes from the island of Melos where tombs have been found at Aspro Chorio, Spathi, Rivari and near Phylakopi (Renfrew 1982: 38). On current evidence it appears that this period witnessed the cessation of cist tombs and the introduction of a new grave type, the rock-cut tomb. Rock-cut tombs consist of one or two round or rectangular chambers that were cut into hill slopes. A short approach passage led to the chamber. They were used for multiple inhumations. As the tombs had been robbed, nothing is known about the grave context beyond a few pottery sherds. Another burial practice, namely pithos burials of children within settlements, is added to the tomb repertoire in this period – examples of which have been found at Phylakopi on Melos and Paroikia on Paros (Barber 1987).

Our knowledge of cemeteries and burial practices in the north and eastern Aegean islands is unfortunately only fragmentary. Preliminary reports indicate that grave types include cist graves, chamber tombs and pithos burials.

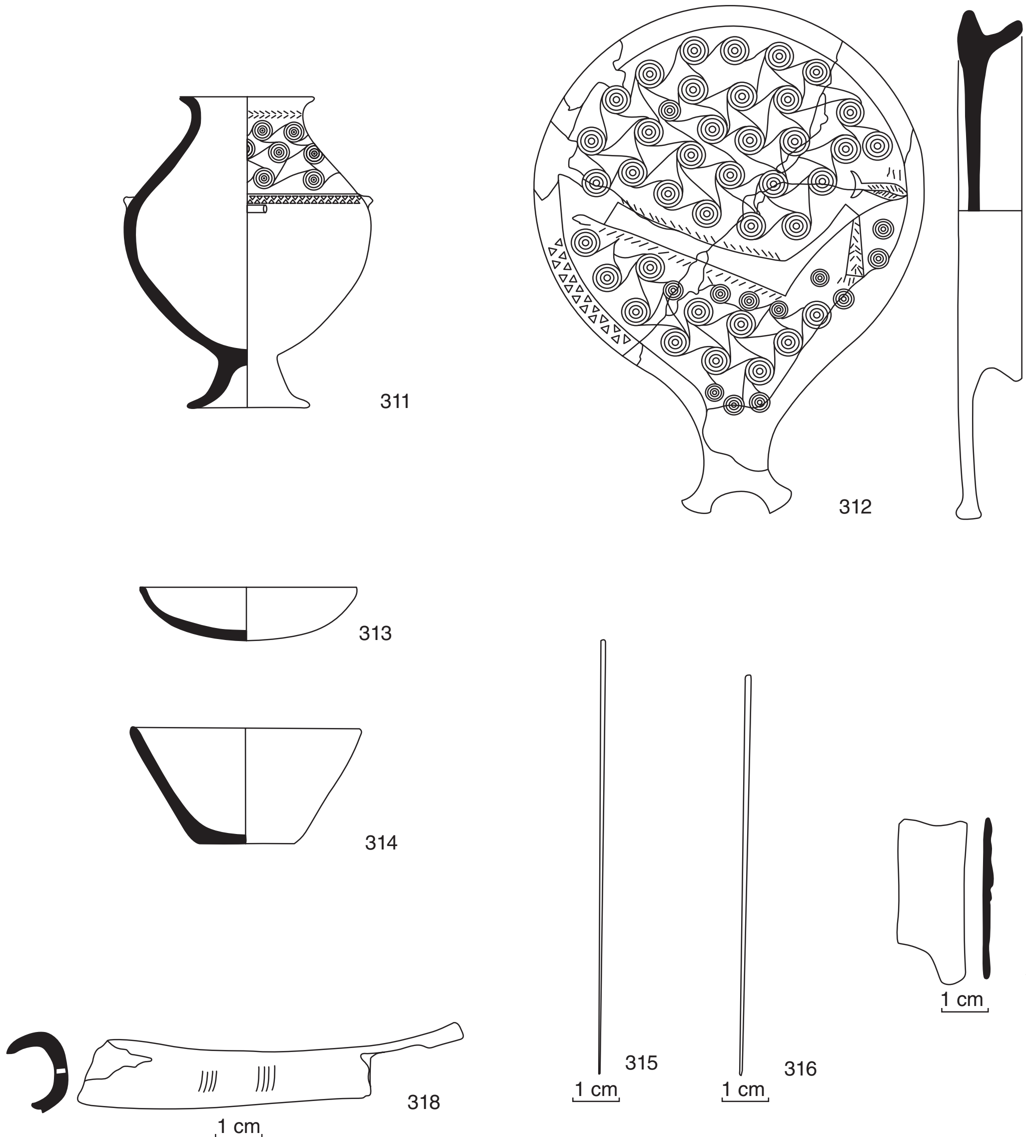


Figure 5.11 Content of Tomb 351 from Chalandriani cemetery on Syros (Hekman 2003: Fig. 64): 3 clay vessels, 1 obsidian blade, seashell, 2 bronze pins, bronze scraper and a carved bone tube inside a frying pan that was decorated with an incised ship. Permission granted by the author.

BURIAL HABITS

Death imposed a juncture on society and required distinct practices and ceremonies to facilitate the deceased's transition from the living to the dead. That this transition was fraught with tensions and uncertainties is visible in the architecture and multitude of rituals that were performed. In the Early Bronze Age, the dead were buried in specially designated cemeteries that were located at some distance from settlements. On rare occasions, such as Chalandriani, a boundary wall was constructed that created a formal physical barrier between the cemetery and the settlement, between the dead and the living. The graves themselves were often arranged in clusters, clearly visible and sometimes had grave markers on top. With all age groups represented among the dead it seems likely that tomb burial was the exclusive method of burial in the Early Bronze Age. Inhumation is the only type of burial; only a single cremation has been found on Dhaskalio. The strongly contracted position of the bodies suggests that the corpse had been bound prior to burial. Together with the lack of doors and the strong roof platform, these features may indicate a desire to keep the deceased entombed and firmly separated from the world of the living. In contrast is the position of the body with the head facing away from the hill and overlooking land or sea, and thus in direct communication with the living. Grave goods, most likely personal belongings, were placed in front of the deceased's face or feet. The exceptions are children who, by virtue of not yet having reached an age where they were associated with personal belongings, were buried without grave goods (Doumas 2002: 41). Contrasting with personal belongings are objects, such as marble vases, palettes, figurines and fine long obsidian blades, which are only rarely found in settlements and appear to have been specifically made for deposition in graves. Tattooing or body painting appears to have been part of the funerary ritual as traces of red or blue pigment, pestles and grinding palettes testify. Following the pulverising of the pigment, water or oil would have been added. Obsidian blades may have been used to remove all bodily and/or facial hair and metal or bone needles to apply the pigment to the skin (Hekman 2003: 186–187) (Figure 5.12). Finally, the common removal of defleshed and disarticulated bones to ossuaries or the removal of artefacts into grave good pits, as evidenced at Rivari on Melos, points to existence of secondary burial, with particular focus on purification rites (Televantou 2008b).

Built platforms seem to be a central part of funerary or commemorative ritual in Cycladic cemeteries. Two types of platforms have been found: 1) platforms constructed on top of individual cist graves and 2) platforms located at the edge of some cemeteries. In some instances, vessels have been discovered on top of tomb platforms, possibly hinting at drinking or libation rituals. The discovery of a deposit of hat-like vases at Ayioi Anargyroi cemetery on Naxos near a 40 m long platform may point towards some ritual performance (Doumas 2008: 170).

A general lack of osteological analyses means that we know very little about the dead themselves, including their age, sex or pathologies. Hekman (2003), for example, relies on the presence of tools/weapons and toiletry equipment to draw conclusions about the gender of the grave's occupant. Rambach (2000: 93–98), while concluding that very few artefacts were gender-specific, nevertheless follows a similar line of thought. This approach is problematic as it is not based on independent verification through skeletal material, but creates instead a circular argument that is ultimately based on modern-day gender perception. A more promising approach to learning about past gender identities could lie in the

Figure 5.12 Marble palette from Amorgos, Early Cycladic II (acc. no. AN1896-1908 AE.182). Image courtesy of the Ashmolean Museum, University of Oxford.

analysis of figurines where male figurines, for example are often depicted as musicians, warriors or hunters, while female figurines are sometimes portrayed as pregnant (Doumas 2002).

While tombs were constructed and equipped in very similar ways, minor details are likely to signal status differences – as shown in the case of Chalandriani on Syros. The size and location of the tomb may be an indicator of prestige, for example, along with the number, quality and type of grave goods. The number of grave goods varied and ranged from none to a single clay pot to several marble or metal objects. Similarly, the presence of marble vessels, such as the kandila, is comparatively rare in grave contexts and may hint at an elevated status of those individuals who have been buried with them (Doumas 2002).

OBJECTS MADE OF STONE

A variety of stones were used in the manufacture of objects both for day-to-day activities and funerary rituals. They range from coarse local stones that were made into tools, such as grindstones, hammerstones, pestles, mortars, weights, discs, to imported Melian obsidian tools and fine blades, polished stone axes of emery from Naxos and finely made marble vessels or figurines from Naxos and Paros. Due to their association with funerary contexts, marble vessels and marble figurines have received the greatest scholarly attention and are discussed in greater detail here.

Marble vessels

Although the carving of stone vessels dates back to the Neolithic period (e.g. Saliagos on Antiparos and Kephala on Kea), it is during the Early Bronze Age that stoneworking became a major craft activity in the Cyclades. While marble was the most commonly used raw material, soft chlorite schist and limestone were also used on occasion. Marble is available on many of the islands, but Naxos and Paros have the best raw material. Based on the skill required in making marble objects, it is likely that they held considerable value. Marble objects encompass vessels, stone palettes and pestles. Also made of marble are the well-known figurines. The majority of stone vessels have been uncovered from tombs and represent a relatively common group of grave goods. For example, 67 stone vases came to light at Chalandriani and 150 at Aplomata cemeteries. In contrast, marble pestles are known from both cemetery and settlement contexts. Thus, it appears that most objects were made specifically for the funerary context, while a few shapes were deposited in the tomb after domestic use.

During Early Cycladic I, the most common marble shapes are the lug bowl, collared jar (or 'kandila'; with or without a pedestalled foot), conical beaker and palette (Figure 5.13). Particularly recognisable are the long pierced lug handles (Getz-Gentle 1996). Most of these were made by hand, although some traces of drill use can be observed (Devetzi 1990). Bowls and palettes sometimes have traces of red or blue colouring, and may be associated with stone pestles for pulverising pigment and mixing colours. As palettes and pestles are commonly found in tombs, it is likely that tattooing or body painting was part of funerary rituals.

The range of shapes increases in the Early Cycladic II period and includes spouted bowls, flaring cups, palettes, jars and pyxides (spherical, cylindrical and elliptical), often with the characteristic flaring 'trumpet' pedestalled foot (Getz-Gentle 1996) (Figure 5.14). Marble examples of sauceboats, frying

Figure 5.13 Kandila of Grotta-Pelos culture (acc. no. AN1896-1908 AE.423). Image courtesy of the Ashmolean Museum, University of Oxford.

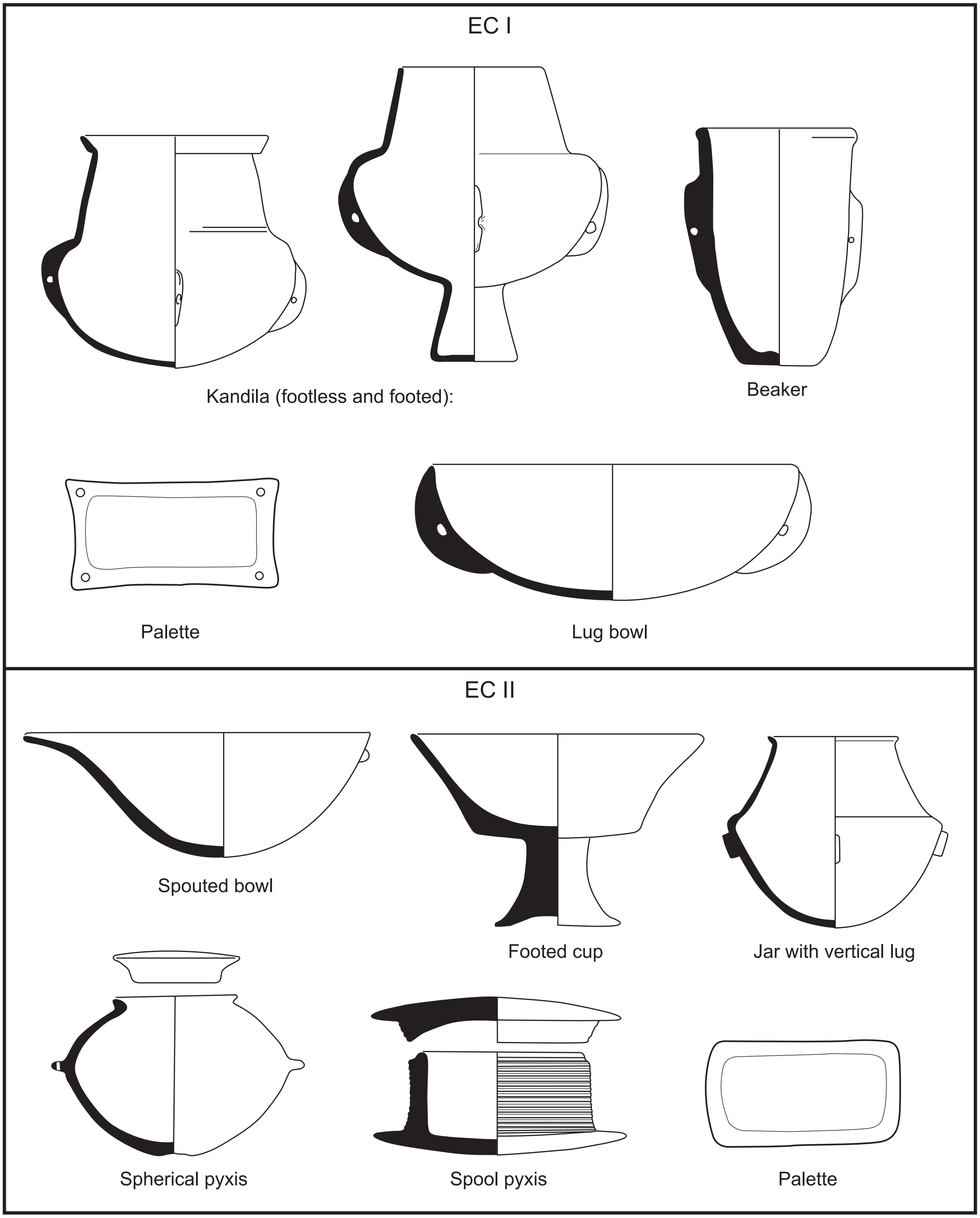


Figure 5.14 EC I and EC II marble vessel types. Not to scale (after Getz-Gentle 1996).

pans and multiple vases ('*kernoi*') are rare. These EC II shapes followed a trend towards simplification that made them less delicate to manufacture and increased the speed of production. After the Early Cycladic II period (Keros-Syros phase), stone vessel production came to an end.

Marble figurines

Marble figurines are the most distinctive and recognisable creation of Cycladic craftsmanship. Small anthropomorphic figurines of clay, bone or stone are of course well known from the northeastern Aegean where they were frequently found in settlements (e.g. Poliochni, Thermi and Emborio). In stark contrast to the Cycladic figurines which are associated with funerary contexts and have their gender always clearly marked, the northeastern Aegean representations were found in association with hearths and storage facilities and did not show any indication of gender.

In the Cyclades, stone figurines were first made in the Late Neolithic (e.g. the 'fat lady' and schematic 'violin' types of the Saliagos culture), but flourished during the Early Bronze Age. Cycladic figurines have fascinated looters, fraudsters, artists and archaeologists alike (Gill and Chippendale 1993; Renfrew 2017). They were primarily discovered from cemeteries where they were placed inside the tombs. Unfortunately, due to illicit looting and trade, many figurines now in museums are without provenance or find context (see Chapter 1). Consequently, we know less about these objects than we would like. In total approximately 1600 figurines are known to exist. Figurines varied in size from less than 10 cm to nearly life-size, although most are below 50 cm in height. Female examples constitute 95% of all known figurines, with the presence of breasts and the pubic triangle clearly indicating the sex. In some instances females may also be shown as pregnant or with postpartum skin folds. Male figures are comparatively rare.

Marble, the raw material used in the manufacture of figurines and vessels, is potentially available from many Cycladic islands. Detailed sampling of marble outcrops on different islands and the application of various scientific provenancing techniques (stable isotope analysis, spectroscopy, grain size) has resulted in our ability to differentiate between islands and between sources on the same island. From the results it appears that the majority of the 280 Keros Hoard samples analysed derived from Naxos. Ios may have been a minor contributor, but there is no evidence of marble from Syros, Amorgos or Paros (Tambakopoulos and Maniatis 2009; also Herz and Doumas 1990; Herz 1992).

The typology and chronology developed by Renfrew (1969) and refined by Getz-Preziosi (1987) still form the foundation for our understanding of Cycladic figurines. Two broad typological groups can be distinguished, namely the schematic and naturalistic tradition (Figure 5.15). The schematic type renders the human body in a stylised way while naturalistic types indicate body parts and characteristic human features. Female folded-arm figurines of the naturalistic tradition represent the 'canonical' type. Broadly speaking, schematic figurines are named after their shape, while naturalistic types take their name from the sites of their discovery.

Most of the figurines of the Early Cycladic I period (Grotta-Pelos culture) are schematic, flat and under 10 cm in size. They can be classified into violin, notch-waisted, pebble, and tripartite shapes. If gender is denoted, it is done so by incisions that describe the breasts and pubic triangle. The naturalistic Plastiras type was manufactured alongside and is characterised by clearly modelled legs, breasts and

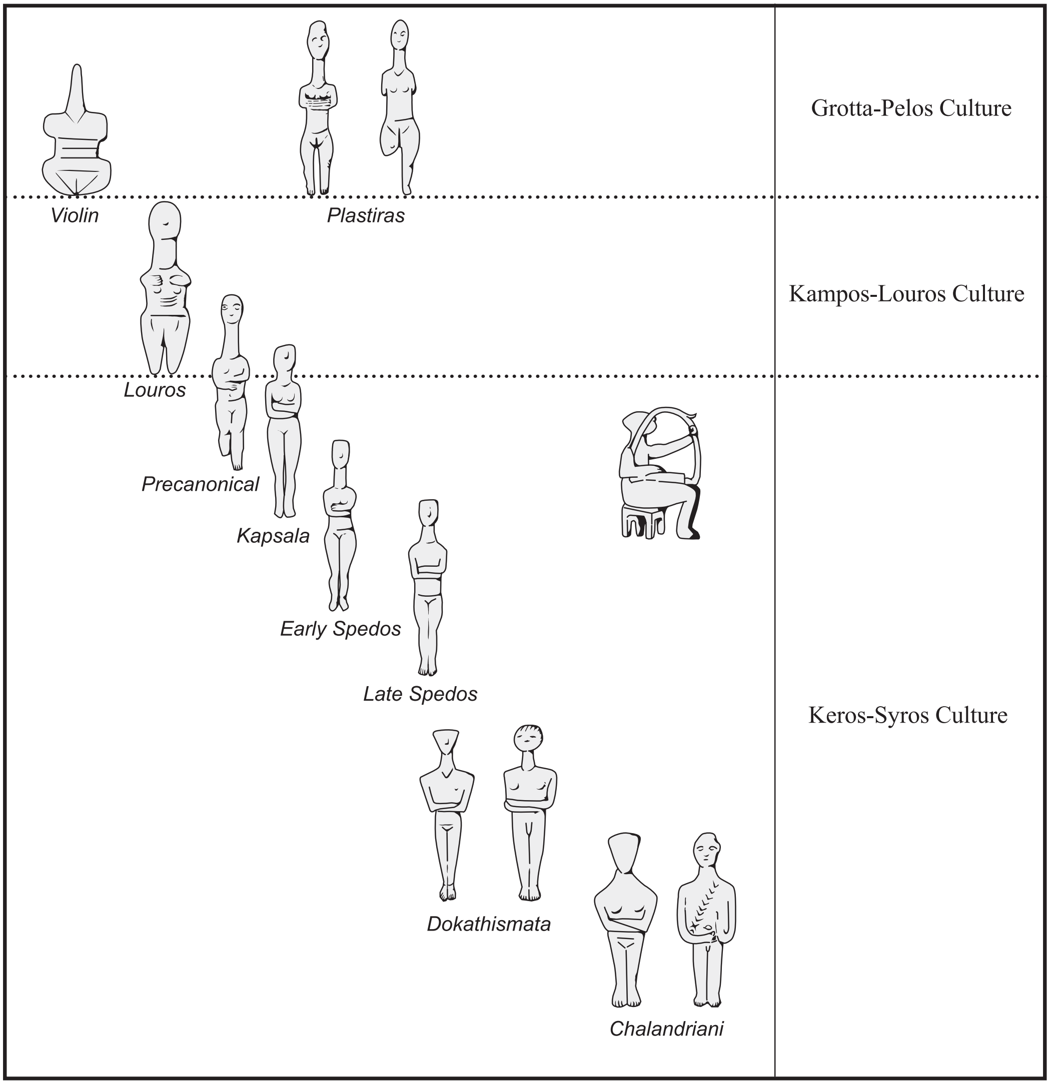


Figure 5.15 Development of Cycladic figurines (after Getz-Preziosi 1987: Fig. 11).

head, and fingertips that touch in front of the chest. The navel, mouth and other body features are indicated through incisions. Female figurines normally display the pubic triangle. A few Plastiras figurines are anatomically indicated as male. An intermediate chronological type is the Louros figurine which is rather featureless with mere stumps as arms, even though the head and legs are clearly demarcated (Renfrew 2017; Getz-Preziosi 1994).

The Early Cycladic II period (Keros-Syros culture) represents the golden age of figurine manufacture when craftsmen produced the typical, 'canonical' folded-arm type. Figurines are generally female, their head slightly bent backwards, arms bent and folded across the chest, legs slightly flexed at the knees and feet pointing downwards (Figure 5.16). Renfrew identified four variants that are distinguished by

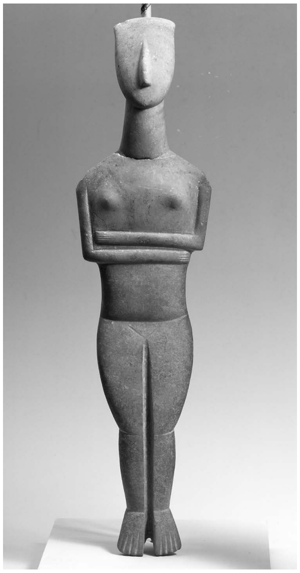


Figure 5.16 Early Cycladic II figurine of the late Spedos variety attributed to the Goulandris Master (Museum of Cycladic Art: Athens, Goulandris Collection 281. Naxos. 63.4 cm). © Museum of Cycladic Art/G. Fafalis.

Figure 5.17 Double pipes player from Keros. Early Cycladic II. Early Spedos-variety style (inv no P3910). Image with permission from the National Archaeological Museum, Athens/Department of Collection of Prehistoric, Egyptian, Cypriot and Near Eastern Antiquities.

size, shape, proportions and the rendering of body features: Kapsala, Spedos, Dokathismata and Chalandriani. A fifth variant, the Koumasa type, is a local copy of the canonical type and only found in Crete. Schematic figurines continue to exist. They belong to the Apeiranthos type where head and body are separated by a narrow neck.

Also to the EC II period belongs a group of complex, three-dimensional figurines, such as standing or seated musicians (e.g. harpist, flute player), a cupbearer, a small figure standing on the head of a larger one, a group of two standing side-by-side, and a group of three figures (Figure 5.17). These artefacts are generally less than 25 cm in size but demonstrate the great creativity and expertise of Cycladic craftsmen.

The production of marble figurines came to an end in the Early Cycladic III period, although a few schematic figurines were still produced during the Phylakopi I culture. These figurines have a triangular or trapezoidal body with arm-stumps.

Originally seen as exemplifying the use of pure, white marble, faint traces of paint residue alerted scholars to the fact that many of the figurines had been painted originally in red (cinnabar), blue (azurite) and perhaps black (Blomqvist 1990). Red was used for facial details and

jewellery, black and blue for eyes, hair and the pubic area. Photographing the figurines under UV-reflecting light has revealed a wide range of designs, some of which appear to have been applied repeatedly over time (Hendrix 1998). Well-known examples of designs are the four vertical lines on each cheek, eye outline and hair indications on a figurine head in Copenhagen and the hair arrangement on a figurine from the Goulandris Collection (Figure 5.18). Many scholars believe that these decorations reflect the practice of human body painting or tattooing, applied possibly as part of funerary rituals (Getz-Preziosi 1987). However, use wear traces on grinding palettes and bowls for grinding pigments may hint at cosmetic purposes also in human daily life (Renfrew 1991: 122).

The apparent conformity of proportions and standardised appearance of folded-arm figurines has given rise to the assumption that they adhered to a *canon*, i.e. a body of artistic principles and rules. Based on an analysis of complete figurines, Getz-Preziosi (1987, 1994) argued that Plastiras figurines

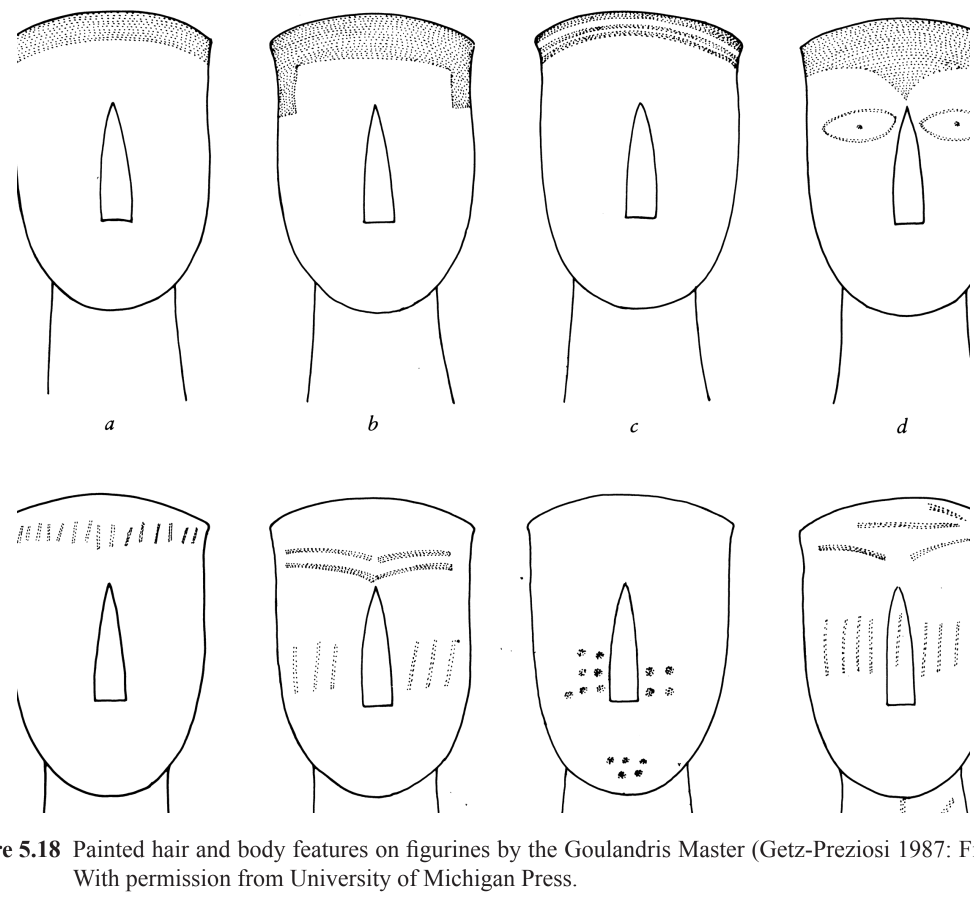


Figure 5.18 Painted hair and body features on figurines by the Goulandris Master (Getz-Preziosi 1987: Fig. 42). With permission from University of Michigan Press.

followed a three-part canon (head and neck; torso; legs) and the Spedos type a four-part canon (head, upper body, lower body with thighs, lower legs). Following in Getz-Preziosi's footsteps, Renfrew's investigation revealed an alternative proportionality with the heads of Spedos types representing one-fifth of their total height (1991: 138–141) (Figure 5.19). While both scholars acknowledge the possibility, and even likelihood, of one or more proportional systems, more complete figures are required to arrive at a definite answer.

Unfortunately, no archaeological evidence of workshops or quarries has survived to offer us insights into the procurement and manufacture of these enigmatic objects. However, replica experiments have demonstrated that inexperienced workers can produce a schematic violin-shaped figurine in five hours and a canonical naturalistic figurine in 60 hours. Experienced sculptors would be able to produce figurines in considerably less time (Oustinoff 1984). Based on the recurrent combination of evidence of unconscious motor skills, technical idiosyncracies, errors, contours and angles, Getz-Preziosi (1987, 1994) has identified hands of different master sculptors within the corpus: the Copenhagen Master, Goulandris Master, Ashmolean Master, Steiner Master – to name but a few. Of these, she considered the Goulandris Master to be the most prolific with almost 80 figurines ascribed to his/her hand (Getz-Gentle 2001). Whether these craftspeople were full-time or part-time

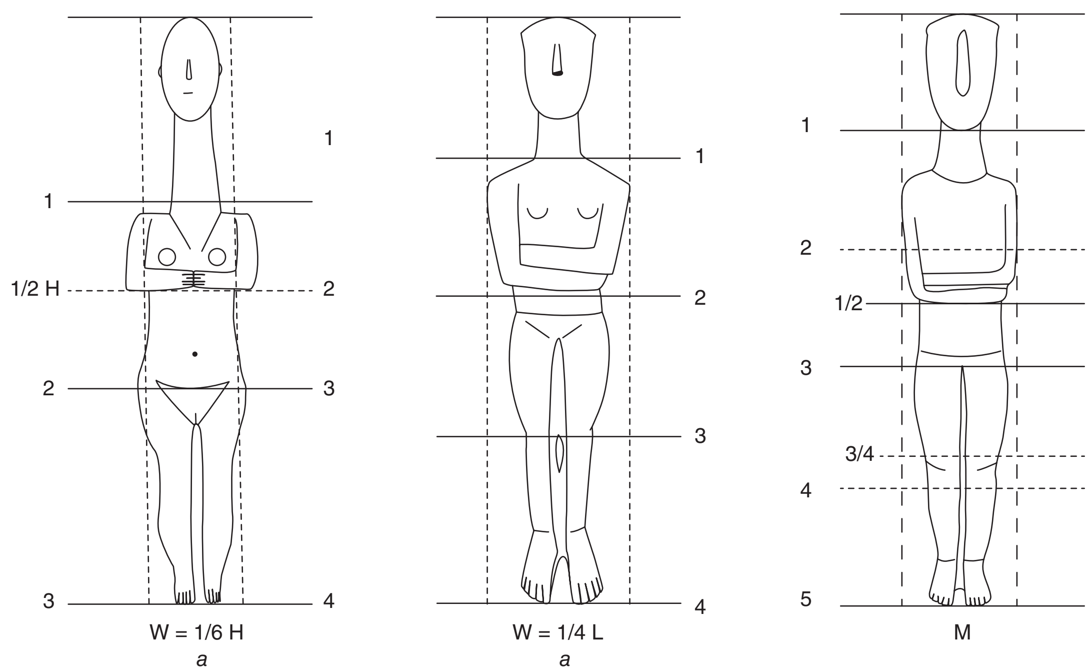


Figure 5.19 Design principles of Cycladic figurines (after Getz-Preziosi 1987: Figs. 15a, 16a; Renfrew 1991: Fig. 9). With permission from University of Michigan Press and C. Renfrew.

specialists, worked in groups or alone, lived locally or were itinerant travellers remains unknown. Getz-Preziosi's work has not been without critics who have attacked both the theoretical underpinnings of her work and its ethical implications. In relation to the former, critics have argued that it is impossible to assign specific pieces to an individual sculptor, and many of the 'Masters' may in fact represent workshops. The ethical aspect is of equal importance and scholars have pointed to uncertainties around the provenance of most of the figurines – most of them were acquired as a consequence of illicit excavations, while several may actually be fakes. More importantly, perhaps, assigning figurines to masters validates them and increases their price on the arts market regardless of their dubious origins (Renfrew 2014).

Significance and interpretation

As most of the figurines have been found in tombs, scholars have tended to interpret them as grave goods. Interpretations range from a use akin to Egyptian *ushabti* figures which were servants in the afterlife, representations of heroes or deities or simple toys (Thimme 1989). As they have not been recovered from all tombs, their use as servants for the afterlife is doubtful. Likewise, the fragmentary nature of figurines seems to speak against their interpretation as representations of a deity. Finally, the exclusive raw material, the quality of manufacture and their delicate nature undermine the toy hypothesis (for a summary of interpretations, see Hoffman 2002: 232–234). More recently, interpretations have focused on the dominance of the female gender. Barber (1987), for example, linked the use of figurines to fertility cults and argued that their occasional appearance in settlements points to the existence of domestic or public shrines. Hoffman (2002), by reference to anthropological and historical comparanda, sees them as essential components in ancestor rituals with the decoration applied at particular rites of passage. The figurines being predominantly female, Hoffman believes that women held key roles in conducting such rituals. That figurines acted as markers of an individual's status and identity is suggested by Broodbank (2000a: 265). Ultimately, the lack of contextual information about the figurines makes interpretation difficult, and scholarly consensus on this topic is as yet elusive.

What we do know, however, is that figurines had considerable value for the islanders as traces of ancient repair attest. Getz-Preziosi (1981) has identified three different types of ancient repairs: perforations either side of a fracture, dowel-holes in the break-site and lead clamps. Repairs were not uncommon. For instance, four of the 37 figurines excavated at Akrotiri on Thera show repair holes at the neck or legs. The fracture would probably have been tied together with twine or leather (Sotirakopoulou 1998). Curation and continuing ritual importance of Early Cycladic figurines is hinted at by their presence in Late Bronze Age ritual contexts, such as the figurine that was discovered together with other cult objects in House A at Ayia Irini on Kea and the figurine hoard in Cenotaph Square in Akrotiri on Thera which was laid down during the early Late Cycladic I period in memory of an EC tomb disturbed during seismic activity (Sotirakopoulou 1998).

Dhaskaleio-Kavos and the 'Keros Hoard'

However, it is the excavations on the island of Keros that have begun to change our understanding of these figurines in fundamental ways. Extensive illicit excavations on Keros, in the locality of Kavos, during the 1950s and 1960s brought to light approximately 300 marble figurines (as well as marble vessels and clay pots) from the Keros-Syros culture. The items illegally entered the international antiquities market and became known under the name of the 'Keros Hoard'. Unfortunately, their precise origin was unknown and it was uncertain whether all objects had come from the same finds context or whether the hoard had been assembled piecemeal. An initial investigation by Getz-Preziosi (1983) and a recent reassessment by Sotirakopoulou (2005) have demonstrated that the hoard is consistent with new finds from Kavos. Joins between 'Keros Hoard' fragments and excavated finds prove that at least some of the figurines came from Kavos, although Renfrew (2008) remains sceptical about the provenance of non-joining objects.

A series of official surveys and excavations have been undertaken in the Kavos area since the 1960s (Doumas 1964; Zapheiropoulou 1968; Renfrew et al. 2007b; Renfrew et al. 2013). These investigations revealed, in addition to the well-known looted Special Deposit North, an undisturbed assemblage 120 m south, which has been called Special Deposit South. The main phase of use for both deposits is the period of the Keros-Syros culture. This assemblage contained broken – mainly imported – pottery, marble vessels (2,400+), figurines (553), and obsidian blades (Figure 5.20). All breakages were ancient and the lack of matching joins within the assemblage or between material from Special Deposit North and

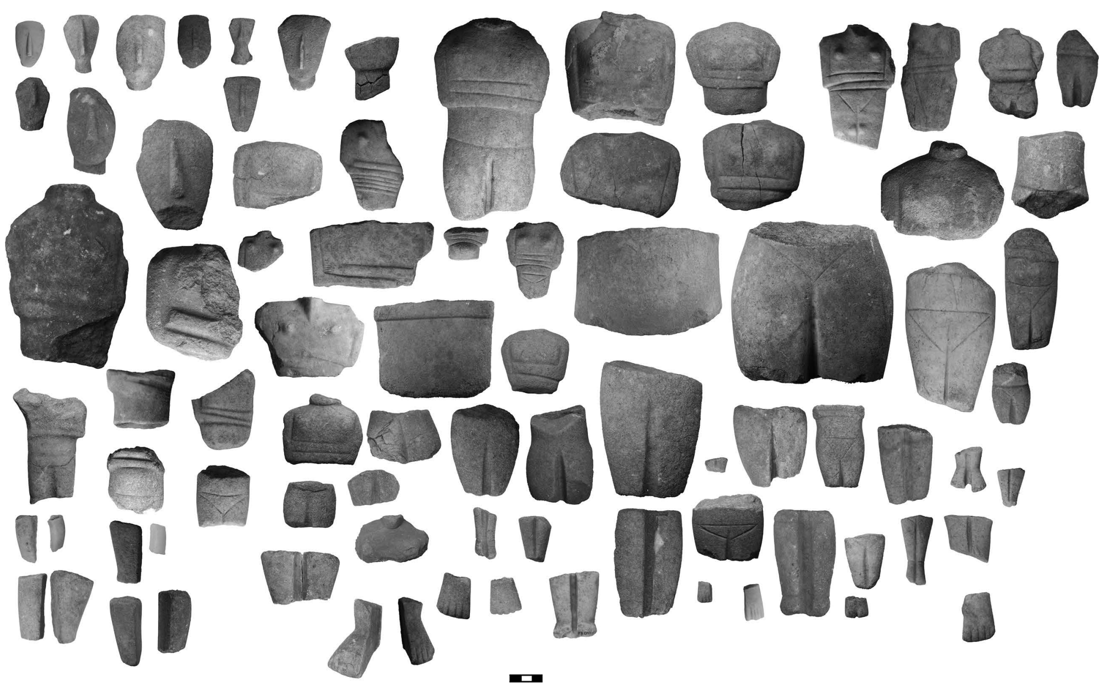


Figure 5.20 Figurine fragments uncovered at Kavos, Keros (Renfrew et al. 2012: Fig. 4). Image courtesy of C. Renfrew.

South indicates that the objects had been deliberately broken elsewhere, possibly even off the island, transported to Keros and buried in this location. Opposite Kavos, on the islet of Dhaskalio, excavators uncovered a major settlement whose occupation included Keros-Syros, Kastri and Phylakopi I culture horizons (Figure 5.21). During the Early Bronze Age, this islet would have been connected to Keros by a causeway. The settlement had a large Hall (14 x 4 m), summit enclosure wall, terracing, and abundant pottery of domestic character, including large quantities of storage jars. Intriguingly, the stone for many of the buildings was imported, most probably from nearby Naxos. The same applies to the pottery which was imported and probably originated from nearby and distant island and mainland locations. No naturalistic figurines have come to light. Environmental studies suggest that occupation was probably seasonal or periodic, and may have involved as many as 400 persons at peak times (Renfrew et al. 2013).

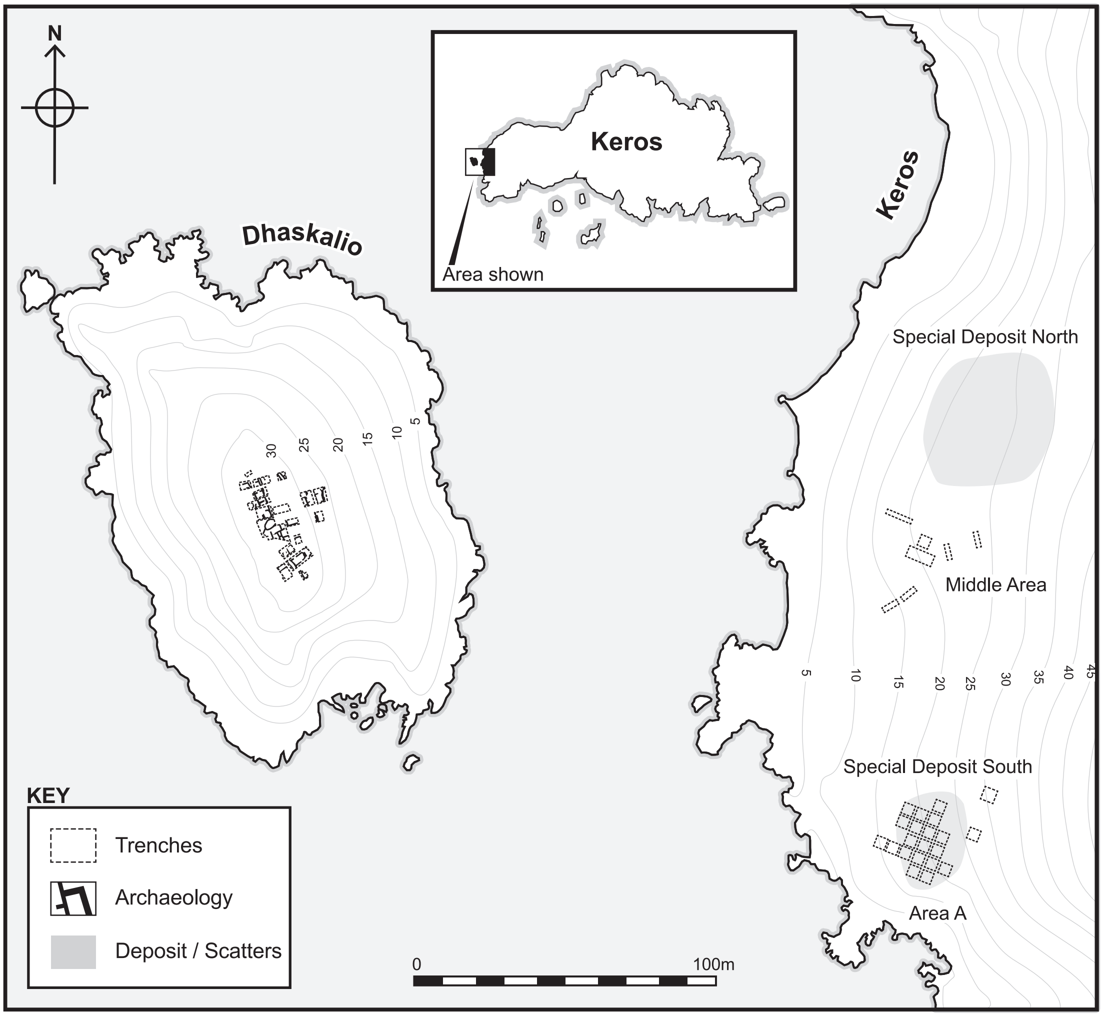


Figure 5.21 Excavations at Kavos and Dhaskalio (after Renfrew et al. 2015: Fig. 1.2).

Originally, archaeologists believed that Dhaskalio-Kavos was a settlement with a wealthy cemetery nearby (Doumas 1964; more recently this interpretation has seen a revival in Broodbank 2007; Whitelaw 2007). However, beyond the presence of marble objects, there is no convincing architectural or artefactual trace that would hint at a cemetery setting. Likewise, apart from the remains of a single house, no further evidence of a settlement has come to light. The lack of an agricultural hinterland and the absence of querns or other evidence of domestic activity are also very telling. Drawing on Höckmann's (1977) suggestion that the Special Deposit North represented a votive deposit in honour of the dead, Renfrew (1984) initially proposed that the site acted as a large pan-Cycladic sanctuary to which worshippers would travel in order to smash objects as part of a ritual ceremony. Again, the lack of physical evidence for funerary activity or a shrine does not support this hypothesis. Following his recent excavations on Keros, which revealed the existence of the largest assemblage of deliberately fragmented marble figurines and marble vessels (outclassing the richest known Cycladic cemetery by a factor of 10), Renfrew has put forward the hypothesis that Keros acted as a symbolic centre and regional sanctuary of the Cyclades during the Early Bronze Age. Keros thus acted as a kind of 'symbolic attractor' where islanders travelled periodically and ritually deposited intentionally broken objects. Renfrew considers it unlikely that this ritual deposition was in honour of a particular deity or part of specific funerary rites. Instead, the fact that islanders went on a pilgrimage to this specific island makes it likely that one of the ritual aspects was the (re)affirmation of a communal, regional identity (Renfrew 2007, 2013).

POTTERY

Much pottery has come to light from tombs and settlements and illustrates the great diversity of activities people were involved in, from preparing food, cooking and dining to storing, transporting and lighting. During this period clay vessels were made using hand-forming techniques. Wheelmade pottery makes its first appearance at the end of Early Bronze Age II in association with Kastri Group material (Choleva 2012), but remains a rare occurrence in the islands until the Middle Bronze Age when the technology is (re)introduced by the Minoans. While much pottery has survived, it is important to recognise that, as far as the Cyclades are concerned, most was recovered from cemetery contexts, not settlement sites, and that therefore our knowledge of shapes, fabrics and decorations is likely to be skewed. In contrast, northeast Aegean pottery is best known from settlements – mainly from old excavations.

During Early Bronze Age I, pottery styles are distinctly regional, although similarities may be shared across cultural zones. The Cyclades and the northern Aegean islands thus follow separate traditions. Northeast Aegean pottery closely mirrors ceramics from western Anatolia while the Grotta-Pelos culture is dominant in the Cyclades. Grotta-Pelos vessels were made of coarse clay with the surfaces often burnished to a dark sheen (Figure 5.22). Decoration consisted of rectilinear patterns incised into the clay; lines, herringbone and chevron patterns are common. On occasion, these incisions were filled with a white substance. Scholars have interpreted the rectilinear designs as imitations of basketry (Rambach 2000). Pots found in settlements are mainly bowls. In contrast, pyxides and footed collared jars are almost exclusively found in grave contexts; they may have functioned as containers for perfumed substances or foodstuff.

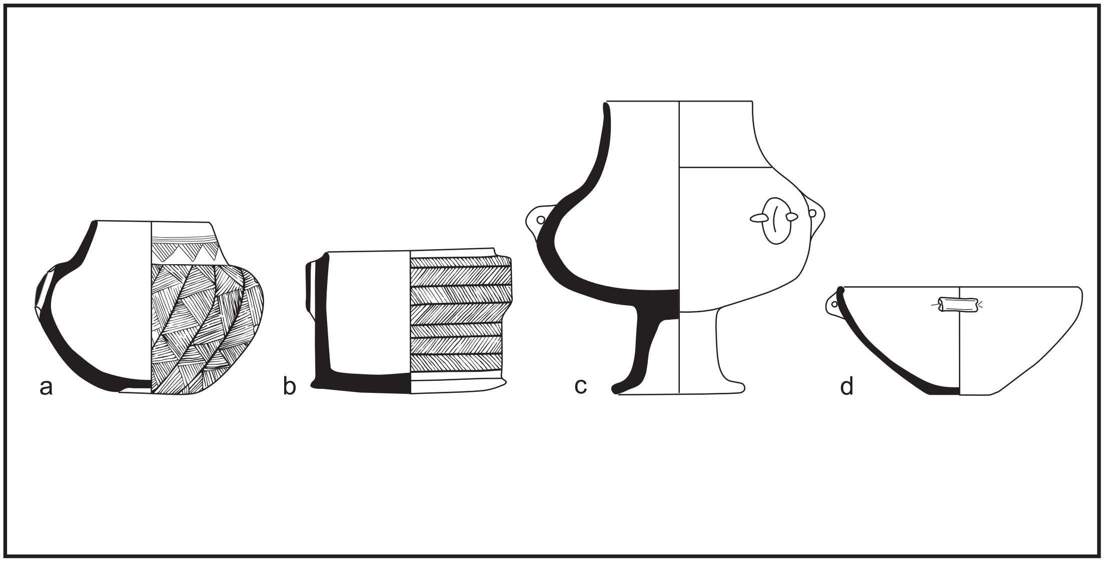


Figure 5.22 Typical Grotta-Pelos pottery types: a) spherical pyxis, b) cylindrical pyxis, c) collared jar, d) bowl.

Potters from the transitional Kampos group (Early Cycladic I–II) preferred to stamp their designs onto the vase, although incisions (with a white infill) continue. In addition to the common rectilinear motifs we now witness the introduction of curvilinear patterns, such as spirals. Among the shapes, bowls with rolled rims and vertical tubular lugs are common. Other shapes are spherical and cylindrical pyxides and footed collared jars (Figure 5.23). The first 'frying pans' appear in this phase. Unlike the Grotta-Pelos culture where a stark contrast can be seen between cemetery and settlement assemblages, the Kampos Group repertoire shows a greater overlap in shapes.

Pottery from the Keros-Syros phase is generally made of finer clay with few inclusions. Incised and stamped burnished wares continue, but painted decoration (dark paint on pale clay) is now added to the repertoire. Bowls, spherical pyxides, footed collared jars and 'frying pans' continue in use, while the jug, saucer, two-part cylindrical pyxis and the 'sauceboat' are new additions (Figure 5.24). The latter is named after its shape; its function is most likely associated with pouring liquids of some kind. 'Urfirnis' becomes widespread during this period and is characterised by a fine buff-orange fabric with a red or dark glossy surface, often combined with painted decoration. Popular shapes are sauceboats, deep bowls and askoi.

The so-called frying pans are enigmatic pottery forms whose function is as yet uncertain. This vessel type is a flat oval or round dish with short vertical walls and a forked handle that somewhat resembles modern frying pans in shape (Figure 5.25). The vessel is burnished and the flat exterior surface is often incised with abstract or figurative scenes, sometimes with white pigment inserted. The decorative motifs include spirals, concentric circles, stars and, most notably, boat depictions sometimes with fish imagery added. At the base of the handle a pubic triangle is frequently visible. Frying pans are common in the Cyclades; they are less common on the Greek mainland and Crete and virtually unrepresented in the northeast Aegean. Having been discovered from both settlement and cemetery contexts, interpretations are forever shifting between the functional and ritual: they may have been filled with water and acted as

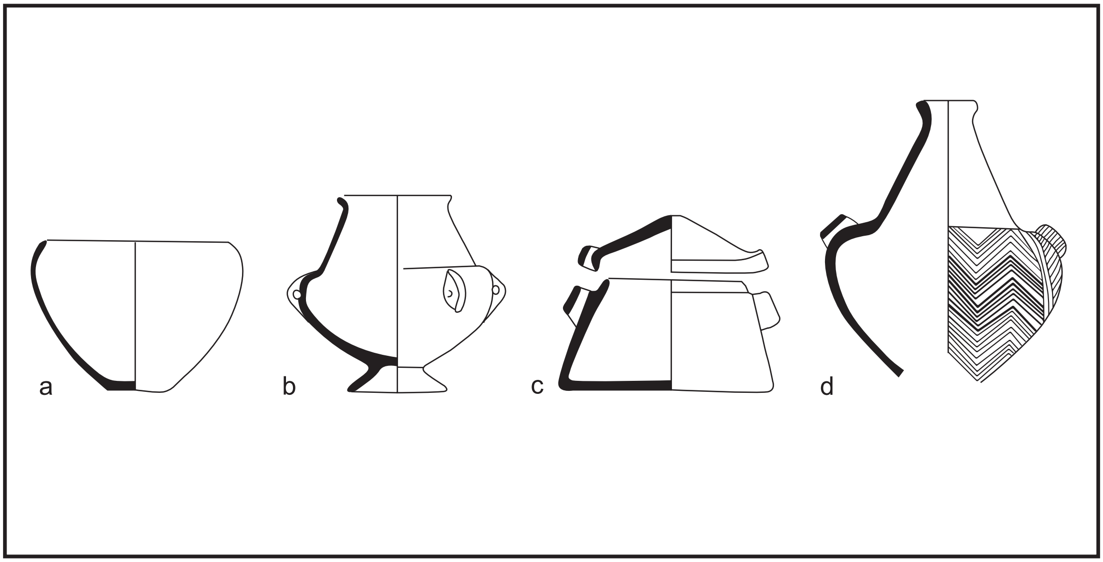


Figure 5.23 Typical Kampos pottery types: a) bowl, b) footed collared jar, c) pyxis, d) bottle. Not to scale.

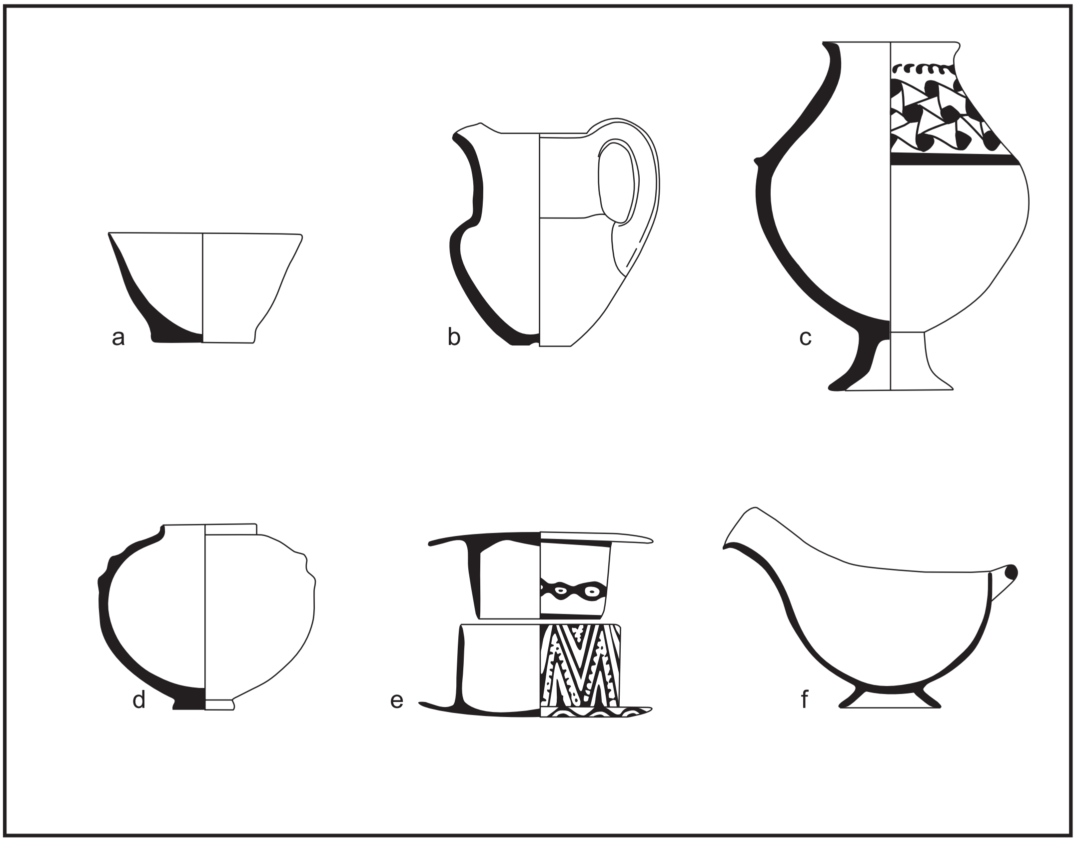


Figure 5.24 Typical Keros-Syros pottery types: a) cup, b) jug, c) collared jar, d) spherical pyxis, e) cylindrical pyxis, f) sauceboat. Not to scale.

Figure 5.25 Frying pan from Syros (inv no P4974). Image with permission from the National Archaeological Museum, Athens/Department of Collection of Prehistoric, Egyptian, Cypriot and Near Eastern Antiquities.

mirrors, or used as food serving dishes or for grinding and mixing colour pigments. When considering their symbolic meaning, scholars make reference to the sea-related depictions as well as the pubic triangle. Common suggestions are that they represent a female deity with power over life and death or stars and sun. The gender-specific imagery resembles that found also on marble figurines and may also hint at fertility symbolism (Coleman 1985; Rambach 2000; Getz-Gentle 1996: 180–182; Goodison 1989: 18–20; Sherratt 2000b: 198–200).

The saucer, spherical and cylindrical pyxis and jug remain popular in the Kastri Group phase (closely related to the Lefkandi I group on the Greek mainland), dated towards the end of the Keros-Syros phase and the transition into Early Bronze Age III. New and foreign shapes make their appearance in association with short-lived fortified settlements. Iconic shapes are the one-handled tankard, *depas amphikypellon*, bell cup, lentoid jug with cut-away spout and straight-sided plate (Figure 5.26). These forms appear to have close affinities to pottery from west Anatolia and are an indication either of the movement of

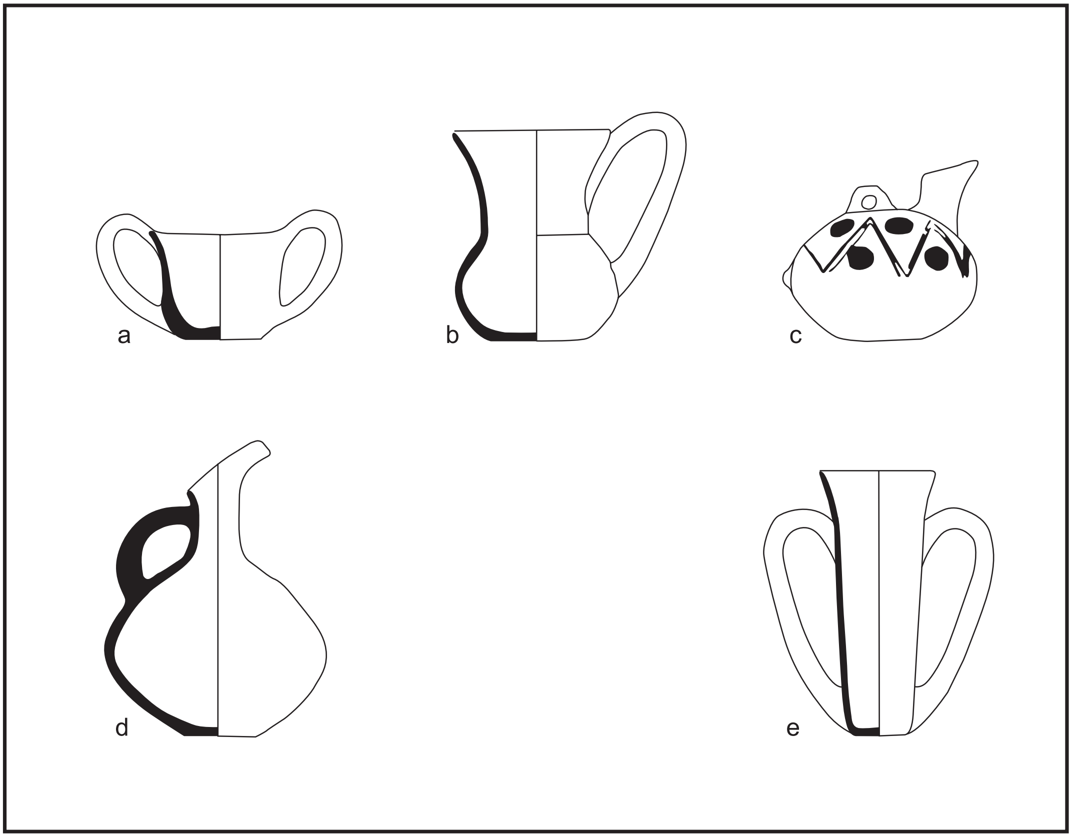


Figure 5.26 Kastri group pottery selection: a) two-handled cup, b) tankard, c) askos, d) jug, e) *depas*. Not to scale.

people or of extensive exchange and mobility between these regions which expressed itself in a shared set (*koine*) of vessel shapes that stretched from the Anatolian coast to mainland Greece and the Aegean islands (Pullen 2013: 546). Pottery surfaces are generally covered with a lustrous red, brown or black slip, and some pots are made with the potter's wheel. Sometimes decoration was incised. It is commonplace to link the introduction of this new pottery style to the appearance of metal objects made of tin bronze. As tin was not available locally in Greece, it must have come via long-distance trade routes from Mesopotamia or Anatolia or a consequence of migrating people (Doumas 1988; Sotirakopoulou 2008).

Originally, scholars perceived the Kastri Group pottery to be homogenous in shapes, origin and chronology across the Aegean, and thus to represent the invasion of people from Anatolia. However, detailed study suggests that vessel types differed in origin, distribution and date, and were most likely produced in and imported from multiple locations (Sotirakopoulou 2008). Uncovered from settlements and cemeteries, most sites only have small quantities of this diagnostic pottery and local traditions continue from the Keros-Syros phase; Ayia Irini is the exception with around 13% of Kastri Group pottery in Period III (Wilson 1999). Only Ayia Irini, Kastri, Dhaskaleio-Kavos and Thera represented the (almost)

complete repertoire, while Korphi ton Amygdalion only had one single shape. Recent work has emphasised how diverse these shape combinations were – there does not appear to be any consistency in types found together. Constituted of both imported and locally made pots, it seems likely that the precise composition of a site's assemblage was governed by consumer choices, and the presence of Anatolian types should be seen as indicator of increased interaction between the Aegean and Anatolia (Angelopoulou 2008).

Painted designs are rare in this period, but can be found on local pedestalled cups. Another new shape is the rather distinctive duck vase.

In the Cyclades, incised rectilinear and curvilinear decoration on a dark burnished background continues into the Phylakopi I phase. The quality of the burnishing is not as good as in the previous phase and scholars thus term this ware 'dark-faced'. There is continuity of shapes, such as the duck vase and the beaked jug. However, new shapes were added to the repertoire and include the barrel jar, various cup types, the spouted Melian bowl, and multiple kernos (Figure 5.27).

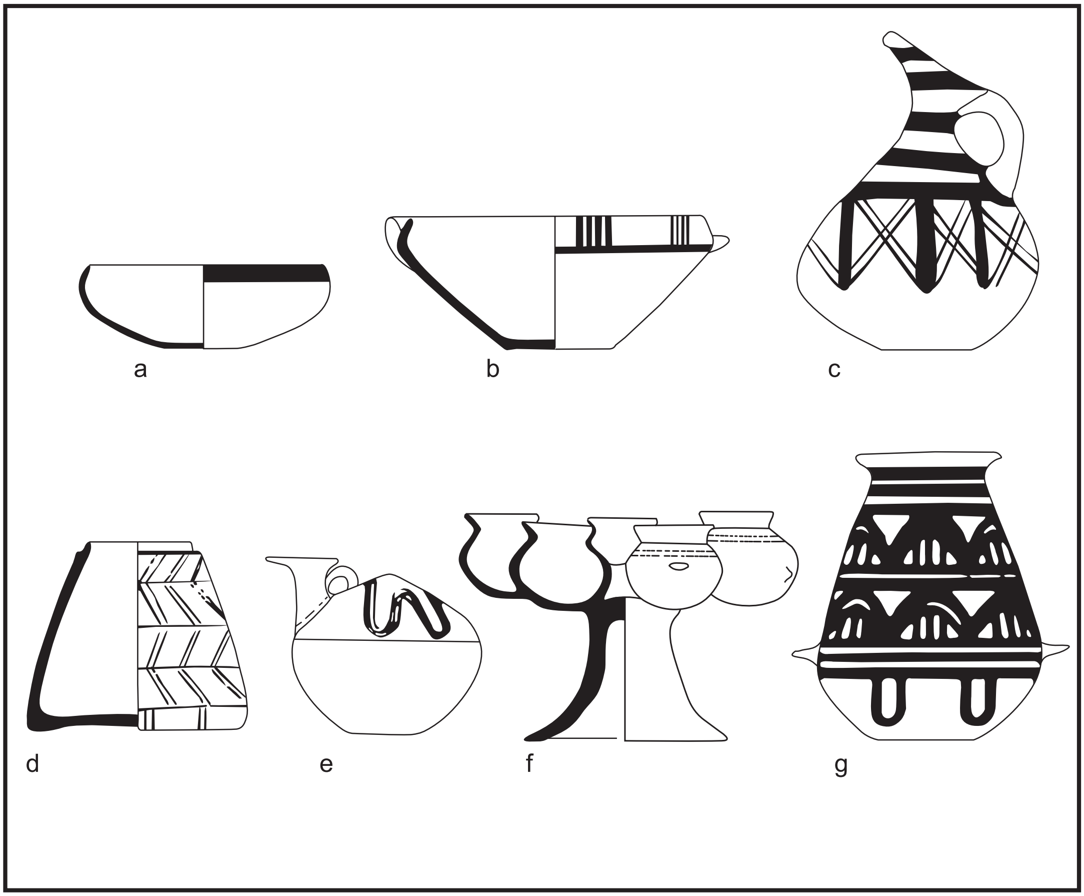


Figure 5.27 Phylakopi I pottery types: a)–b) bowls, c) jug, d) pyxis, e) askos, f) kernos, g) storage jar. Not to scale.

Painted decoration (dark paint applied to a pale slip or vice versa) becomes more popular, but remains geometric and rectilinear in design. Curvilinear painted designs make their appearance only towards the end of this period. Figurative decoration (incised or painted) is extremely rare. The best-known examples are the longboats incised onto frying pans. Pots are now fired at higher temperatures.

During this period, the islands in the north and east Aegean display strong ceramic affinities with western Anatolia and Macedonia. The most iconic new shape is the wheel-thrown, red polished plate that was made of pale clay. Other shapes, such as the duck vase, were either imported from the Cyclades or copied locally and testify to the close connections between the northeast Aegean, the Dodecanese, the eastern mainland coast and the Cyclades during this period. As in the Cyclades, painted decoration now becomes more popular.

Pottery manufacture

During the Early Bronze Age I and II periods, all pottery was made by hand. The presence of mat, cloth or leaf impressions on the underside of vessels demonstrates that potters formed them by hand. Scholars generally assume that vessels were produced by local part-time potters for local consumption. However, this assumption is erroneous. For example, a careful macroscopic analysis of the ceramic assemblage of Dhaskaleio-Kavos by Broodbank (2000b) demonstrated that, as a minimum, 50% of the pottery was imported. Most imports came from the neighbouring islands of Amorgos, Naxos and Kouphonisia, but more distant sources, such as Thera, Syros, Siphnos as well as the Greek mainland, were also presented. Likewise, petrographic analysis of fabrics has revealed that vessels made of Melian or Siphnian pale clay made their way to Kea and Keros (Vaughan and Wilson 1993; Wilson 1999: 69–71). Wilson estimates that approximately 30% of pottery was imported to Ayia Irini in Period II and 25% in Period III (1999: 234). These examples are sufficiently widespread to demonstrate that trade and exchange of pottery (presumably often for the content it contained) was sophisticated and commonplace in the Early Bronze Age Aegean. While local production or exchange between neighbouring islands predominated, the movement of Anatolian-influenced Kastri Group pots indicates that some shapes travelled great distances, as is demonstrated for Akrotiri and Ayia Irini which received pottery from the western and central Cyclades and beyond (Day et al. 2009). Given the sophistication with which different pottery types were produced and moved across the sea, it is highly possible that specialist potting centres already existed at this early stage – something that has already been accepted for Early Bronze Crete (Day et al. 1997; Whitelaw et al. 1997).

The potter's wheel makes its first appearance in the Aegean during the Kastri Group where it was utilised to make vessels of Anatolian characters, such as cups, plates and tankards. While this new forming technique had become widespread in the eastern Aegean already in Early Bronze Age III, it was adopted in the Cyclades only in the Middle Bronze Age as a consequence of Cretan influence (Berg 2007a).

METALS

Our understanding of metal sourcing, processing and distribution has greatly improved over the last two decades. In the Cyclades, Amorgos, Syros and Naxos have yielded rich metal finds while in the northeastern Aegean all settlements have abundant material. Isotope analyses have determined the origin of finished metal objects, ores and litharge, while surveys and excavations of mining and processing areas have illuminated how the metals were extracted and melted. Finally, excavations of settlements have brought to light moulds for making tools and weapons. What is notable about the emerging picture is that the two major metal-producing regions, namely the Cyclades and the Troad, appear to have developed technological traditions independent of each other and whose distribution ranges did not overlap. For example, isotope analysis of copper, silver and lead objects from Cretan, Cycladic and Greek mainland sites demonstrate that the raw materials were sourced predominantly locally from the Cyclades and Lavrion in Attica. Some 'foreign' metal is present, but only in small proportions. The use of perforated furnaces is an additional distinguishing feature of the local Greek tradition. Contrasting with this picture are the objects found in the northeastern Aegean islands which, like Troy, received their metal almost exclusively from regions in Anatolia (Begemann et al. 2003).

Chronology and types

Renfrew assigns the invention of metallurgy a major role in the emergence of civilisation in the Aegean as it initiated the creation of new professions, the accumulation of wealth and the expansion of trade contacts (1972). From its early beginnings in the Neolithic period, he envisaged an evolutionary trajectory into the late Middle/early Late Bronze Age where we see its most skilful application in the metal objects deposited in the Mycenaean Shaft Graves. As evidence of metal use and production was scarce in the Early Bronze Age I period, Renfrew believed that metallurgy only became widespread in the Early Bronze Age II period when the repertoire expanded greatly and the technology advanced. The degree of change was captured well by Branigan who agreed with Renfrew that we had witnessed a "metallurgical explosion" (1974: 105).

The perception of a metal-poor Early Bronze Age I period is, scholars now believe, incorrect. Based on the growing quantity of Neolithic metal finds, the abundance of metal in the Early Bronze Age II period, an increasing sample size of Early Bronze Age I objects and obvious continuities in artefact types from the Neolithic into Early Bronze Age II, the current consensus is that metal use was widespread also in the Early Bronze Age I period. The reason for its relative scarcity in the archaeological record is its lack of deposition in graves. This practice only became common in the succeeding period when metal items played a role in expressing an individual's identity and status (Sherratt 2007: 250). Thus, if such a 'metallurgical explosion' occurred, it must be back-dated to the Early Bronze Age I period – if not the Late Neolithic.

Copper and bronze

Copper deposits can be found on many islands (Figure 5.28). As in the Late Neolithic, the islands of Siphnos, Kythnos and Seriphos, as well as Lavrion in Attica, provided most of the raw material (Gale and Stos-Gale 2008). According to Stos-Gale and Gale (2003: 89–90) who analysed 163 copper artefacts from the Aegean islands, 31% were made of copper from Siphnos, 25% from Lavrion and 18% from Kythnos. The remaining 20% are attributed to Cyprus, Anatolia, the Near East, northern

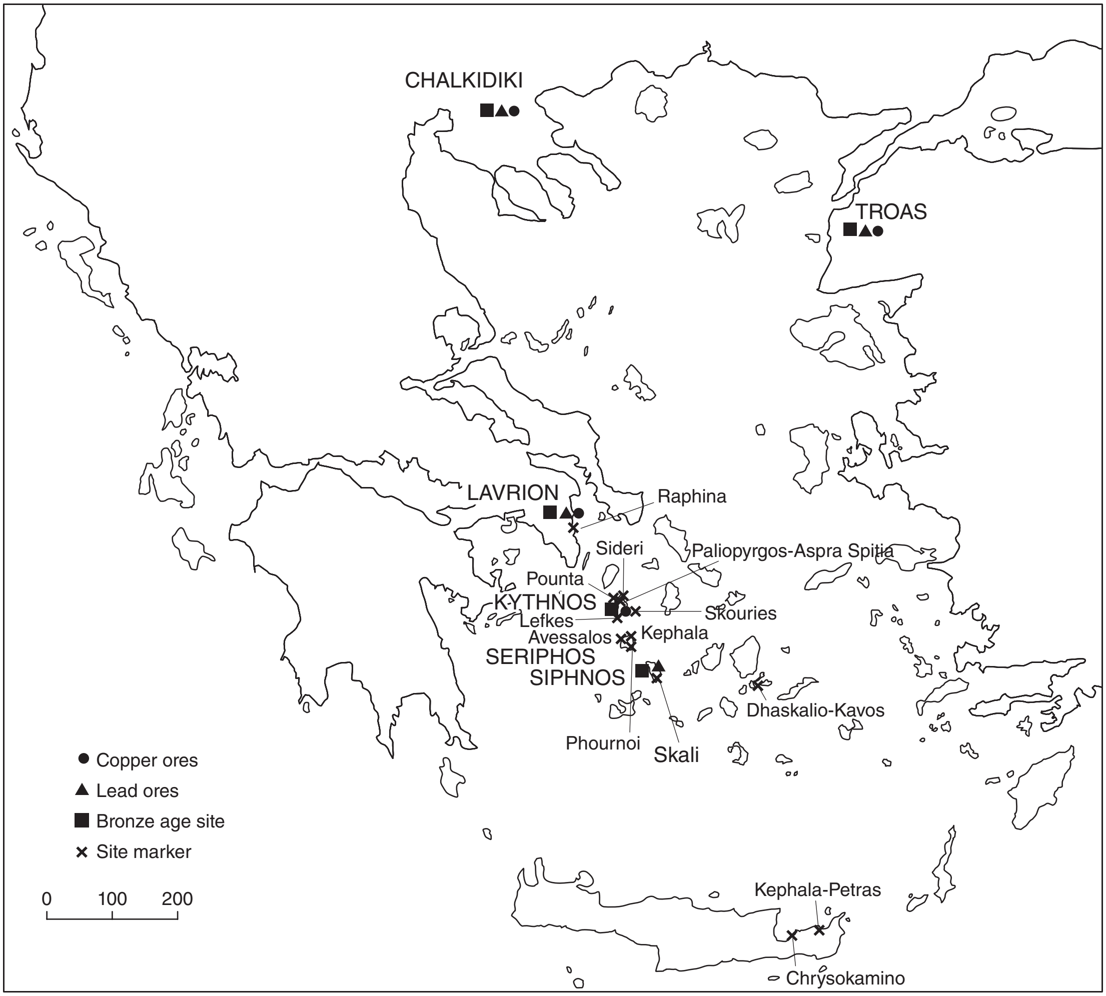


Figure 5.28 Copper and lead sources in the Bronze Age Aegean (after Georgakopoulou 2016: fig. 4.2 and Stos-Gales & MacDonald 1991: fig. 1).

Aegean, Seriphos and Kea. Copper objects found in mainland contexts show a clear preference for Lavrion (42%), but Cycladic sources still constitute a considerable 20%. The situation is reversed for Crete where 50% of all copper artefacts from Ayia Photia have been shown to have a Cycladic provenance, approximately 20% are made of copper from Lavrion and approximately 20% from Cyprus (Figure 5.29).

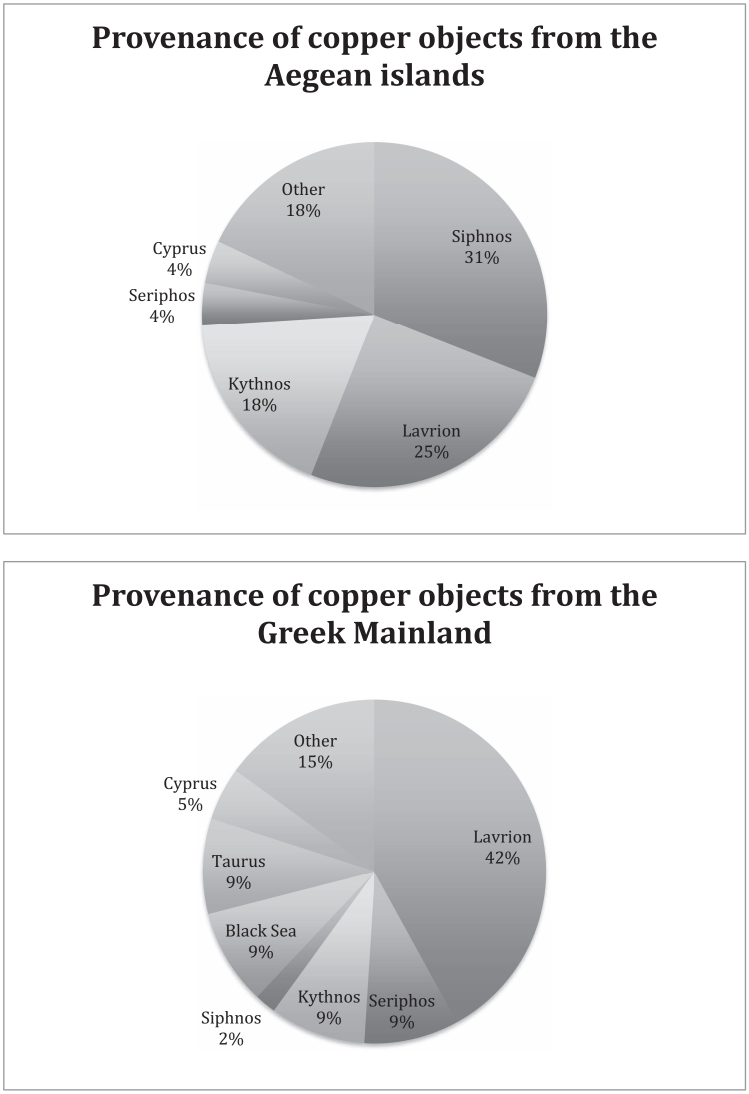


Figure 5.29 Provenance of copper objects from the islands and the mainland (after Stos-Gale and Gale 2003: Plates XVI a and b).

Copper and bronze were used for a wide range of objects, including personal ornaments (pins, wires, tweezers, razors), household tools (needles, awls, saw-blades, wires, chisels, fishhooks), weapons (daggers, spearheads) and even seals (Branigan 1974; Renfrew 1972: 318–336). Their presence is evidence of a wide range of crafts and activities that islanders engaged in, such as woodworking, fishing, stoneworking, and agriculture.

Silver

Rich silver deposits are located on Siphnos and at Lavrion in Attica (Wagner and Weisgerber 1980; Gale and Stos-Gale 2008) (Figure 5.28). Surface finds of ceramics close to the Ayios Sostis silver mines on Siphnos, a few even from a deposit inside one mine, were mixed with mining debris and date the mining activities to the Early Bronze Age. The ceramics included crucibles (a clay pot in which metals are heated or melted), tuyères (a clay nozzle through which air is delivered into a furnace), and domestic pots (Gropengiesser 1986, 1987). Silver objects are commonly found in the Aegean. The majority are personal ornaments (e.g. necklace beads, bracelets, rings, pins, diadems). Exceptional are a small number of silver vessels, such as the two bowls and cup found on Amorgos and a little jug from Naxos (Branigan 1974; Renfrew 1972: 318–336).

Lead

Lead mines can be found at Lavrion in Attica and on Siphnos (Figure 5.28). Lead is a very malleable material thanks to its low melting point. For this reason it was regularly used for repairing clay pots (e.g. at Ayia Irini, Kynthos, Kastri, Phylakopi, Kolonna). Lead was also popular for use in jewellery, such as pendants and bracelets. More unusual are the rare lead figurines from Ios and Antiparos and three lead boat models from Naxos, similar to those depicted on Cycladic 'frying pans' (Branigan 1974; Renfrew 1972: 318–336). A small number of lead seals have survived from Amorgos, Kea and Naxos. The most common motif is a cross with quadrants that is also familiar from impressions on vases (Angelopoulou 2006: 221; Zachos and Dousougli 2008).

Gold

No source of gold exists in the Aegean and the material must have been imported from Anatolia or Macedonia. Gold objects mainly belong to the category of personal jewellery. They are relatively common in the Greek mainland and Crete, but rare in the Cyclades where a gold bead from the Phyrroges cemetery on Naxos and a couple of gold objects from Dhaskalio are the only known examples (Zachos 1999: 154; Renfrew 1972: 318–319; Branigan 1974; Georgakopoulou 2013). Gold is widely used in the northeastern Aegean where a gold leaf from Thermi and a bracelet torque and earrings from Poliochni

speak to the proximity of the islands to Troy which was a known centre of metalworking and produced objects of outstanding quality (Renfrew 1972: 318–336).

Copper alloys

Copper ores commonly contain trace amounts of other elements, such as arsenic, nickel or lead. When these trace elements are present in minor concentrations, scholars consider them to be naturally occurring additions. When these elements are present in significant amounts (> 1%) they may have been deliberately added during the smelting process ('alloying') in order to change the properties of copper. The earliest alloy in the Aegean is arsenic. Tin as an alloy is first known from the northeastern Aegean islands; in the southern islands it is associated with the Kastri Group (Stos-Gale et al. 1984).

A common alloy is bronze, made by combining copper and tin. Tin is not available in the Aegean and its sources remain unknown. Tin bronze appeared in the Aegean for the first time in the Early Bronze Age II period; a pure tin bangle from Thermi on Lesbos attests to trade in pure metals. The amounts of tin present in Aegean artefacts is generally small, indicating that tin was a natural trace element in ores found outside Greece. The exceptions are two bronze objects from Lithares in Boeotia, one from Amorgos and three from Kos that contain up to 10% of tin. In these instances it is likely that tin was deliberately added to make an alloy. While the Lithares and Amorgos copper came from the Black Sea, the three Koan objects originated in Kythnos and Siphnos (Stos-Gale and Gale 2003: 91). In the northeastern Aegean, tin became an ever more popular alloying element and, by Poliochni Yellow, more than 50% of all analysed bronzes were actually tin-bronze alloys. Isotope analyses, however, indicate that the source of this copper was non-Greek (Pernicka et al. 1990).

For many years scholars considered the widespread use of arsenic-rich copper the hallmark of the Early Bronze Age. However, recent data from isotope analyses demonstrate that arsenic-rich copper was actually rather rare. A study of copper prills (i.e. solidified metal drops) from Seriphos showed that only four samples had arsenic measurements while the majority consisted of pure unalloyed copper. With arsenic contents rarely rising above 1%, scholars consider it to be a natural trace element rather than deliberate alloying (Georgakopulou et al. 2011). Recent analyses of slag from Skouries on Kythnos support this inference as no arsenic-rich slag was reported among the almost 100 samples tested. These new findings contradict earlier reports of ten slag fragments with arsenic contents varying between 0.1% and 6.6% which gave the appearance that arsenical copper was very common (Gale and Stos-Gale 1989). The current consensus is that the Cyclades produced predominantly non-arsenic rich copper, but that a small minority of ores may have unusually high arsenic contents (Catapotis and Bassiakos 2007: 73–74).

In contrast stands the evidence from Poros-Katsambas on Crete where – in addition to crucible slags with 1–6% of arsenic – scientists observed copper prills and crucible slag with very high arsenic concentrations (52% and 23% respectively). Here, scholars have interpreted these results as intentional alloying (Doonan et al. 2007: 110; Doonan and Day 2007). A picture of intentional arsenic alloying also

emerges from Chrysokamino on Crete where isotope analyses have shown a difference between non arsenic-rich ore samples and prills with a notable arsenic concentration. This means that arsenic-rich minerals had to be added to the copper ore during the smelting process (Catapotis and Bassiakos 2007: 72–73). The same appears to apply to bronzeworking in the northeastern Aegean islands where arsenic was a common alloying element, though in these instances the source of arsenical copper alloy was not Greek, but probably came from northwest Anatolia (Davis 1992: 724).

Copperworking

The process of copper production can be broken down into several stages: mining the ore, breaking it up, smelting the ore to extract metal, secondary smelting (in some instances), hammering and casting of the finished object. Evidence of metalworking is available in the form of furnaces, bellows or blow pipes, slags, crucibles, prills, moulds and stone tools.

Aegean copper sources are well known. No large deposits have been found on the islands and the majority are made up of small to medium-sized outcrops. As subsequent mining activity has obliterated traces of early exploitation, establishing a firm date for galleries is virtually impossible. Neither can metals be dated directly. The only mines securely dated to the Early Bronze Age are Lavrion in Attica and Ayios Sostis on Siphnos (Gropengiesser 1986, 1987). Where possible, archaeologists had to rely on pottery found in close proximity to the mining site or remains of nearby processing facilities. Given the lack of permanent settlements in the vicinity of mining sites, access to ores was probably not controlled by island communities or individuals. The great abundance of ore outcrops and the diversity of ore types exploited also make control less likely.

Once copper ore had been mined, it was crushed with choppers, hammers and grinders. Good examples exist at Avessalos, Poliochni, Thermi, Emborio, Akrotiri and Kastri. Once crushed, the ore was transported to smelting sites, sometimes located at considerable distance across the sea. A rather extreme example is Chrysokamino on Crete which received copper ore from Kythnos and Lavrion, a sea voyage of at least 250 km and 300 km. Given the geographic distance between mining and smelting sites, it is likely that the location of processing sites was governed by ease of access to fuel for firing, clay for making furnaces and labour (Betancourt 2006: 180). The crushed copper ore, together with fuel and fluxing agent, was placed in a small hollow in the ground. A perforated clay cylinder and bellows helped to create the required draft and melted the ore. Following the smelting phase, furnaces were smashed open to extract the slag. The slag was then broken into pieces to retrieve small pieces of copper (Betancourt 2006: 179–189). Fragments of single-use furnaces are common at most processing sites. This activity typically took place on windswept north-facing promontories. This choice of location suggests that craftsmen wanted to maximise the benefits of the north wind. These sites were distant from settlements, inaccessible from sea, but had good visibility across sea and land, and Broodbank has rightly commented upon this notable contrast between secrecy on the one hand and advertisement on the other (2000a: 294).

The existence of both small and large slag heaps reveals two distinct organisational practices: small to medium-sized slag heaps at Sideri and Paliopyrgos on Kythnos, and Ayios Sostis on Siphnos indicate

that exploitation of ores seemed to have been opportunistic during the Early Bronze Age; once discovered, small deposits were mined and ores immediately smelted nearby. In contrast, large slag heaps are known from Skouries on Kythnos, and Kephala and Avessalos on Seriphos – with slag estimates ranging from several hundred tonnes for Skouries to 100,000 tonnes for Avessalos (Philaniotou et al. 2011). They accumulated due to repeat visits over long periods of time and by multiple users. Lead isotope analysis of slag samples from Skouries on Kythnos indicates, for example, that ore was transported here for smelting from multiple local (and possibly even off-island) deposits (Catapotis 2007: 213). Similarly, 20 circular stone-built structures have been interpreted as metallurgical specialist activity areas (possibly shelters for smelting operations or processing ores). They are likely to be contemporaneous and may represent workshop areas of local and itinerant metal workers. Assuming that each unit required three or four craftspeople, up to 80 people may have worked at these sites periodically (Catapotis 2007: 213–214).

It is intriguing to see that many settlements did not appear to have imported finished objects, but rather remelted copper that was then transformed into the desired metal object on-site. Evidence for this final stage of the production of metal artefacts, that is the crafting of the actual object, comes from Kastri where fragments of two moulds have come to light. Mould fragments for tools and weapons (esp. midribbed dagger) have also been excavated at Poros-Katsambas on Crete (Wilson et al. 2008: 268) and eight moulds for casting single axes together with pounders, grinders and abraders that may have served as metalworking tools at the cemetery of Ayia Photia (Tsipopoulou 2007) (Figure 5.30). The techniques used were rather simple and included hammering and casting. A more sophisticated organisation is visible at Thermi where multiple craft workshops specialised in metal production. At Poliochni, the level of complexity was even greater with jewellery and tools being manufactured by different specialists (Kouka 2008: 288).

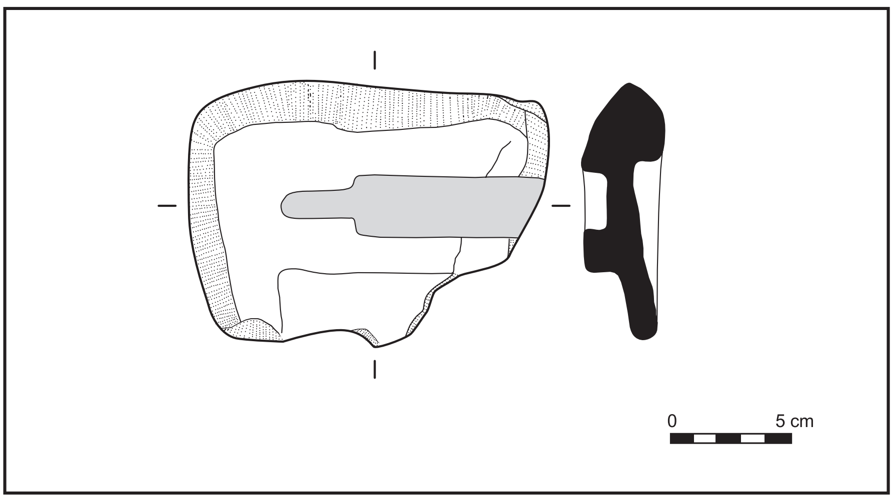


Figure 5.30 Open mould from Kastri, Syros (after Doumas 2011: Fig. 17.17).

Organisation of production

The organisation of metal production was extremely varied, and it is apparent from the evidence that modern concerns for standardisation, labour costs and manufacturing efficiencies were not shared by the islanders. Instead, the process was characterised by spatial separation: first, the ore was extracted from a mine and underwent primary processing nearby. Next, it was transported over short or long distances to other locations for secondary processing. Casting, hammering and polishing would then take place at the final destination (Broodbank 2000a: 293–297; Georgakopoulou 2016). Each stage was potentially performed by different individuals, at different locations and in different organisational contexts (Sherratt 2007: 251). This unpredictability indicates that considerations around maximisation of profit or rationalisation of production were far from the islanders' minds. Instead, the origin of a metal object appears to have been intentionally obscured while its spatial, temporal and transformative journey seems to play a much more important role. Drawing attention to the centrality of sea travel and mobility in Aegean metal networks, Sherratt (2007: 251–252) argues for the existence of metallurgy as a lifestyle activity whereby a metal worker's identity is created and maintained through their movement across sea and land, their interaction with each other, and their practical metallurgical skills in bringing forth finished objects. The deposition of crucibles, for example, in graves at Ayia Photia on Crete, demonstrates how tightly a person's identity may be bound up with their craft skills.

In contrast, Doonan and colleagues (2007) have argued that, despite the temporally and spatially dispersed organisation of metalworking, it was the same individuals who mined, processed and cast the metal. Similar skills and knowledge were required for each stage and workers would have travelled with the material from place to place. The former stages were rather secretive and the work was undertaken at remote locations. The final casting and hammering of the object probably took place in the public arena. The metal workers' ability to locate suitable sources, the secrecy of their craft, their mastery of fire and the distance travelled created a distinct exotic identity for metal workers and, in turn, for the objects themselves. While it is possible that some metal workers were itinerant, the domestic pottery repertoire from Chrysokamino on Crete supports Sherratt's view that workers were most likely locals as they used local ceramic styles, local fabric recipes and local stone tools (Betancourt 2006: 180).

The impact of metal

There can be little doubt that the impact of metals on the Aegean islanders was substantial. Developments in technology and the availability of versatile new materials brought about many changes, though these changes may have been more selective than one might expect. Comparing the artefact repertoire before and after the explosion of metals, Branigan (1974) summarises the impact the introduction of metals had on food production and industry: little evidence exists to support a qualitative or quantitative change in hunting, fishing, or agricultural activities. While some of the tools were now produced in the

new material, they substituted existing types and did not constitute an improvement over or an addition to existing bone or stone types.

He paints a rather different picture for industry. Here, the impact of metals was manifold. New tool types were created and existing tool types were improved upon. According to Branigan, it was the woodworking industry that experienced the greatest gain through the availability of entirely new tools for felling, heavy and light work. These include different varieties of axes, chisels, saws, spikes and nails (Figure 5.31). These innovations would have had beneficial effects not only on furniture-making, but also on ship-building. Metalworking therefore contributed indirectly to increasing mobility and interaction in and beyond the Aegean Sea. Other industries that benefited are textile manufacture, leather working, and stone-vessel carving – although Branigan (1974: 135) believes this impact to have been minor as craftsworkers continued to use traditional tools. It is only in the bone-working industry where we can see competition between the old and new material emerging. Following the introduction of metal pins, awls and needles at Poliochni, for example, the previously abundant bone counterparts declined rapidly and were soon superseded by the metal types (Branigan 1974: 138–139). It is important to remember that, at the time of writing, only a handful

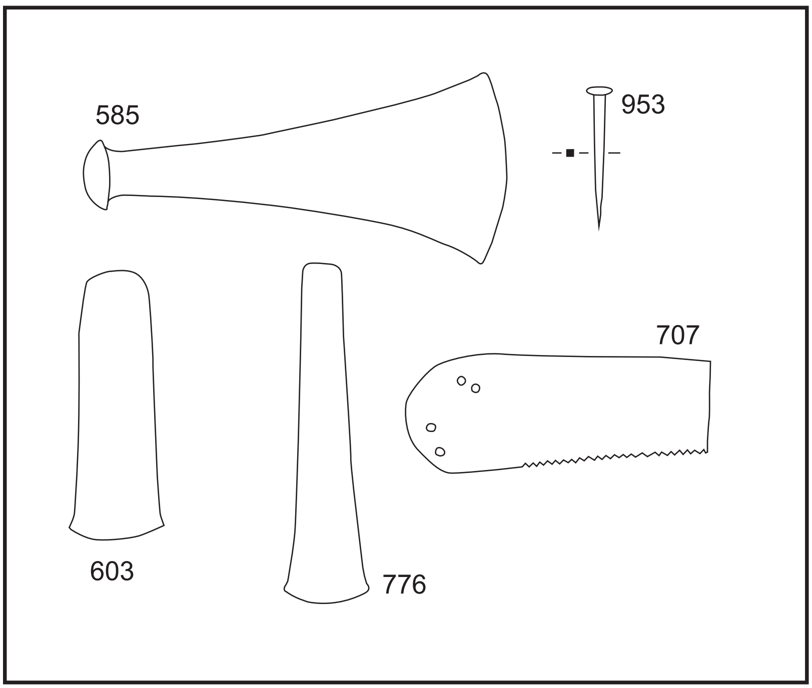


Figure 5.31 Selection of Early Bronze metal tools (after Branigan 1974: Cat. no 585 (single axe from Naxos), 603 (flat axe from Naxos), 707 (saw from Naxos), 776 (chisel from Chalandriani), 953 (nail from Troy)).

of Neolithic metal examples were known to Branigan. The increase in metal finds from the Neolithic period over the last few decades may, in time, require scholars to reassess whether the metal explosion outlined by Branigan should be back-dated to the Final Neolithic. At the time of writing, the scholarly consensus is that metallurgy emerged in the Neolithic, but became ever present in the Early Bronze Age.

However, metal's true impact was its appeal as a symbol of wealth and status. The appearance of tool hoards attests to this trend. On the Aegean islands, hoards are known from Poliochni, Kythnos, Keros and Kastri (on the mainland, hoards were discovered also at Petralona, Eutresis, Thebes as well as in Troy). The 'Kythnos Hoard' (now considered to come from Naxos) contained an impressive group of tools that included three flat axes, three large chisels, one axe-adze and three heavy shaft-hole axes. In total, the bronze accumulated in this hoard weighed almost 7 kg. That the phenomenon of hoards was not restricted to tools can be seen in the case of Poliochni where weapons constituted part of the hoard (Renfrew 1972: 325–327). Hand in hand with metals as a status symbol is the manufacture of items for personal adornment for men and women. The use of colourful metals and the introduction of a wide range of ornaments and jewellery types, as well as their deposition in graves, demonstrates the use of metals as a means to express an individual's identity and social standing (Renfrew 1972: 332–336).

CONTEXTUALISATION: CONNECTIVITY AND MOBILITY

Throughout the Early Bronze Age, the intensity of contact within and between regions connected by the Aegean Sea waxed and waned. The Grotta-Pelos and Phylakopi I cultural periods were times of relative introspection for the islands and contacts with the distant world were limited. In contrast stand the Kampos Group and Keros-Syros culture periods where trade intensified and the Aegean Sea became a highway for interaction in all directions.

In fact, in his ground-breaking book *The Emergence of Civilisation*, Renfrew (1972) alludes to the 'international spirit' that manifested itself in the Aegean during the Early Bronze Age II period, the Keros-Syros culture. He was referring to noticeable cultural homogeneity in material culture, technological know-how, cultural conventions and practices across the entire Aegean, embracing an area that reached from Crete in the south to the Greek mainland in the north and west, and Anatolia in the east. The shared technological and cultural traits included the proliferation of metal types and metallurgical practice in general, the 'international' repertoire of ceramic forms (e.g. the sauceboat, *depas amphikypellon*), and the wide-ranging distribution of marble figurines. As a consequence of this intense trading activity, regions became more connected and culturally less distinct (Renfrew 1972: 451–455). Renfrew singled out two factors that he considered crucial contributors to this development: the invention of the longboat as a means to travel longer distances at greater speed and the expansion of metallurgy, leading to the ready availability of good weapons and the use of metals as an attractive wealth indicator (Renfrew 1972: 455).

Sotirakopoulou (2008) has conveniently summarised the nature of relations between the Cyclades, the north and east Aegean islands and the Anatolian coast during the Early Bronze Age:

During Early Bronze Age I, contacts were sporadic, but mutual, and we can see practices, objects and ideas being adopted in different regions. For example, Cycladic marble figurines (Emborio, Chios, Aphrodisias), marble vessels (Tigani, Samos, Iasos) and clay vessels (as well as local imitations at Tigani and Iasos), Cycladicizing cist graves and burial habits (Iasos) found their way onto the eastern Aegean islands and settlements along the Anatolian coast. Going the other way were clay vessels and marble figurines resembling Troan types (Naxos, Thera, Poliochni, Thermi, Emborio, Heraion).

Early Bronze Age II is characterised by a notable increase in the intensity of trade and the widespread use of metallurgy. Influence and movement of objects are multi-directional. Cycladic pottery shapes (Troy, Heraion, Emborio, Mytilene, Ephesos, Kos), marble vases (Thermi, Emborio, Kos, Aphrodisias), marble figurines (Miletus), Melian obsidian (Troy, Thermi) and spearhead types (Thermi, Troy) are found at many eastern sites. Eastern influences on the islands – most likely mediated by the wealthy island centres of Poliochni, Thermi, Emborio and the Heraion in the northeastern Aegean – are particularly visible in metal tools and weapons (Amorgos, Naxos, Syros, Paros), but also spindle whorls (Syros, Naxos, Melos). Late in this phase we witness the appearance of the corridor house type (Aegina, Skyros, Liman Tepe as well as many sites on the Greek mainland) and the fortifications with horseshoe-shaped bastions (Aegina, Skyros, Naxos, Thasos, Liman Tepe). The direction of influence is rather less certain for these architectural features. Widespread is the presence of intrusive ceramic shapes of Kastri Group types, such as the *depas amphikypellon* and the one-handled tankard whose appearance coincides with the first use of the potter's wheel. On both chronological and typological grounds, Sotirakopoulou believes that these shapes originated in Asia Minor before spreading to the Aegean (2008).

Contact and interaction between the different regions continue in Early Bronze Age III, although they are considerably diminished in intensity and scope. Ceramic shapes are now the most common objects of exchange. Cycladic forms are present at the Heraion, Rhodes, Kos and Aphrodisias while Anatolian shapes found their way to Thera, Kea and the Greek mainland, presumably via the centres on Samos, Kos, Lesbos and Lemnos (Sotirakopoulou 2008).

Colonies

Unlike mutual contacts with the eastern regions, Cycladic interaction with Crete appears to have been rather one-sided. Connections were strongest during the transitional Kampos Group period when Cycladic imports and Cycladic-style graves can be found along the northern coast of Crete, giving rise to the belief that Cycladic colonies existed on Crete during this time (Renfrew 1972). It is clear from the archaeological evidence that these contacts were intense, but also selective, temporally limited to the Kampos Group period and spatially localised to the northern coast of Crete. At the

same time, not all of the Cycladic islands participated at equal intensity, and connections appear particularly strong with Naxos, Ano Kouphonisi and Amorgos, which appear to have been centres of maritime trade.

Considerable Cycladic influence can be found at many sites along the northern coast of Crete, such as Pyrgos burial cave, as well as the cemeteries at Gournes, Petras and Ayia Photia. Of these, Ayia Photia is generally considered to have been a Cycladic colony as burial habits and grave architecture closely resemble those from Ano Kouphonisi (Betancourt 2008; Broodbank 2000a: 302–303). Two hundred and sixty-three pit and underground chamber tombs have been excavated (Figure 5.32). The chamber tombs consisted of a vertical shaft that led to a doorway into a small round or rectangular underground room in which the skeleton was laid. Most tombs only contained a single burial – a practice unknown on Crete where multiple burials were the norm. Grave offerings consisted mainly of clay vases and obsidian. More than 90% of these vases were Cycladic types of the Kampos Group, such as bottles, kernoi or pyxides, and were imported from various production centres in the Cyclades or, in some cases, imitated locally. The remainder of the vases are of Minoan types. In addition to clay vases, offerings included obsidian blades, two crucibles with adhering copper, metal tools and weapons, personal ornaments and marble bowls (Betancourt 2008). The presence of Cycladic objects in other cemeteries along the northern coast of Crete is less dominant, although still considerable. What is different in these instances is that imported Cycladic raw materials and finished objects were placed into typical Cretan communal tombs together with Minoan pottery. The example of the Archanes cemetery is instructive. Tholos Gamma and Tholos Epsilon are similar in their period of use, architectural features and construction. However, they differ substantially in the quantity and quality of grave goods. Tholos Epsilon contained artefacts, ornaments and figurines of local manufacture; a few obsidian blades constituted the only Cycladic imports. In contrast stands Tholos Gamma which had abundant artefacts and ornaments made of imported materials, including copper daggers, marble figurines, beads and pendants. In total, over 50% of all grave goods have a Cycladic origin. In this local context, access to finished objects and exotic raw materials from the Cyclades demonstrated a family's wide-ranging exchange connections, their wealth and status. It is this status-enhancing ability of Cycladic objects that scholars believe contributed to their popularity in Early Bronze Age I/II Crete (Papadatos 2007).

Cycladic objects also found their way into settlements. Poros-Katsambas was a big Cretan port town (Wilson et al. 2008). Excavations revealed that approximately 30% of the Early Bronze Age I/II ceramic assemblage was imported from the Cyclades (or locally produced to imitate Cycladic forms). Poros received large amounts of raw material from the Cyclades. These included obsidian from Melos and metals from Kythnos. The existence of very large quantities of Melian obsidian debris and metal-processing equipment and slag reveals Poros as a processing, manufacturing and distribution centre.

How short-lived these intense relations were between Crete and the Cyclades is apparent in Early Bronze Age II (Keros-Syros culture). By this time the picture had changed dramatically. Discounting isolated finds of cist graves, the difference between Cretan communal tombs and Cycladic burial practices is now marked. Cycladic imports continue to reach Cretan tombs, but are now small in numbers;

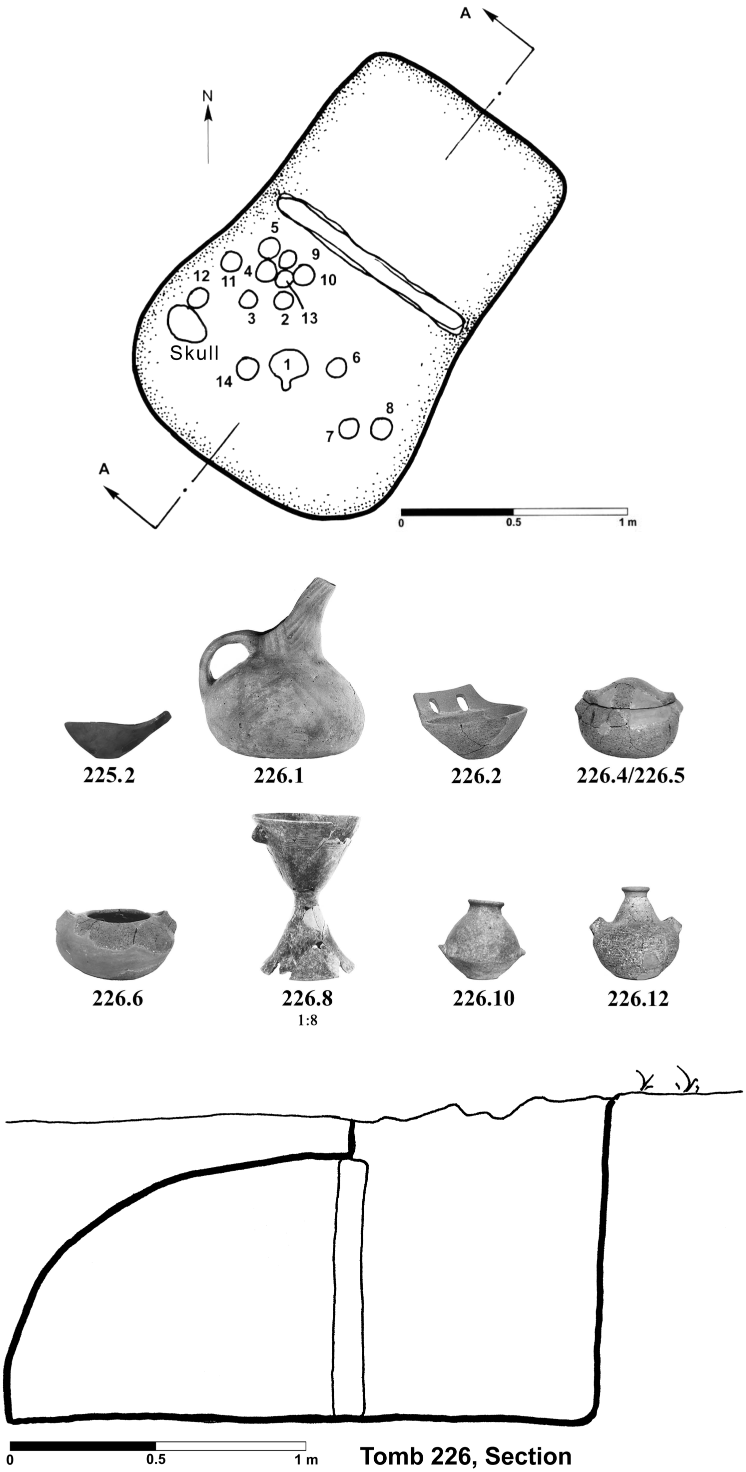


Figure 5.32 Tomb 226 from the Ayia Photia cemetery (Davaras and Betancourt 2004: Figs. 511–513). With permission from P.P. Betancourt. Images courtesy of INSTAP Academic Press, Philadelphia, PA.

they consist predominantly of marble figurines and vessels, obsidian blades, as well as tools and weapons of Cycladic copper and silver. These objects have been interpreted as prestige items (Alram-Stern 2009: 36). Very few Cycladic ceramic imports (e.g. 'sauceboats' and storage jars) come from settlements. Relatively large numbers are reported from Poros-Katsambas where Cycladic-style pottery made up 2% of the ceramic assemblage, 90% of which were collared transport jars, indicating that it was the contents that was attractive to Cretans rather than the pots for their own sake. The other 10% of Cycladic imports consisted of 'sauceboats' which may have acted as prestigious serving dishes (Wilson et al. 2008).

Cycladic contacts with the Greek mainland were regular in the Early Bronze Age I/II period. Cycladic artefacts found their way into most settlements and cemeteries, and many were copied locally, such as collared jars, bottles, pyxides, frying pans, marble vases and figurines, as well as obsidian blades (Kouka 2008). However, the cemeteries at Manika on Euboia, as well as Tsepi and Ayios Kosmas in Attica also show Cycladic influence in the tomb architecture and have, akin to Ayia Photia on Crete, been interpreted as representing the movement of islanders to these regions. Unlike Crete, where the intensity of contacts waned in Early Bronze Age II, interaction with the mainland remained active. It is only in the Early Cycladic III period that imports and interaction waned. Whether this signals a complete break in contacts or rather a re-orientation of trade links to favour large ports, such Kolonna on Aegina, still awaits further research (Alram-Stern 2004: 486).

During the Early Cycladic III period, the emerging picture is one of considerable regionalism with reduced contacts between regions. Maran (1998) has identified five distinct ceramic regional zones in Greece: northeast Peloponnese with Aegina, central Greece, Euboia-Magnesia Group, western Peloponnese and the Phylakopi I culture in the Cyclades. The eastern Aegean islands are part of the Anatolian influence sphere.

Boat travel

Implicitly or explicitly, the Cycladic islanders are considered to be the agents of change by virtue of their ship-building skills, seafaring knowledge and ready access to desirable raw materials. However, concrete evidence of boats is hard to come by. Small clay boat models from Markiani on Amorgos and Mochlos in Crete testify to the existence of boats for coastal travel/transport and inshore fishing – most likely made of timber or skin over a wooden frame. The four long and narrow lead models from Naxos and Palaeokastro on Crete, in contrast, show the same type of craft also depicted on the clay 'frying pans', the so-called longboats (Figure 5.33). According to Broodbank (2000a) longboats were large (up to 19 m length), narrow paddled boats with a high stern that could accommodate up to 25 oarsmen. He argued that it was specific sites that, due to their favourable location in relation to trade routes and network links within the Cyclades, became centres of long-distance trade and voyaging. Each of these sites was able to build these craft and mobilise manpower locally or regionally for longboat voyages. With an estimated daily range of 40–50 km, a return trip to a nearby island was achievable within one

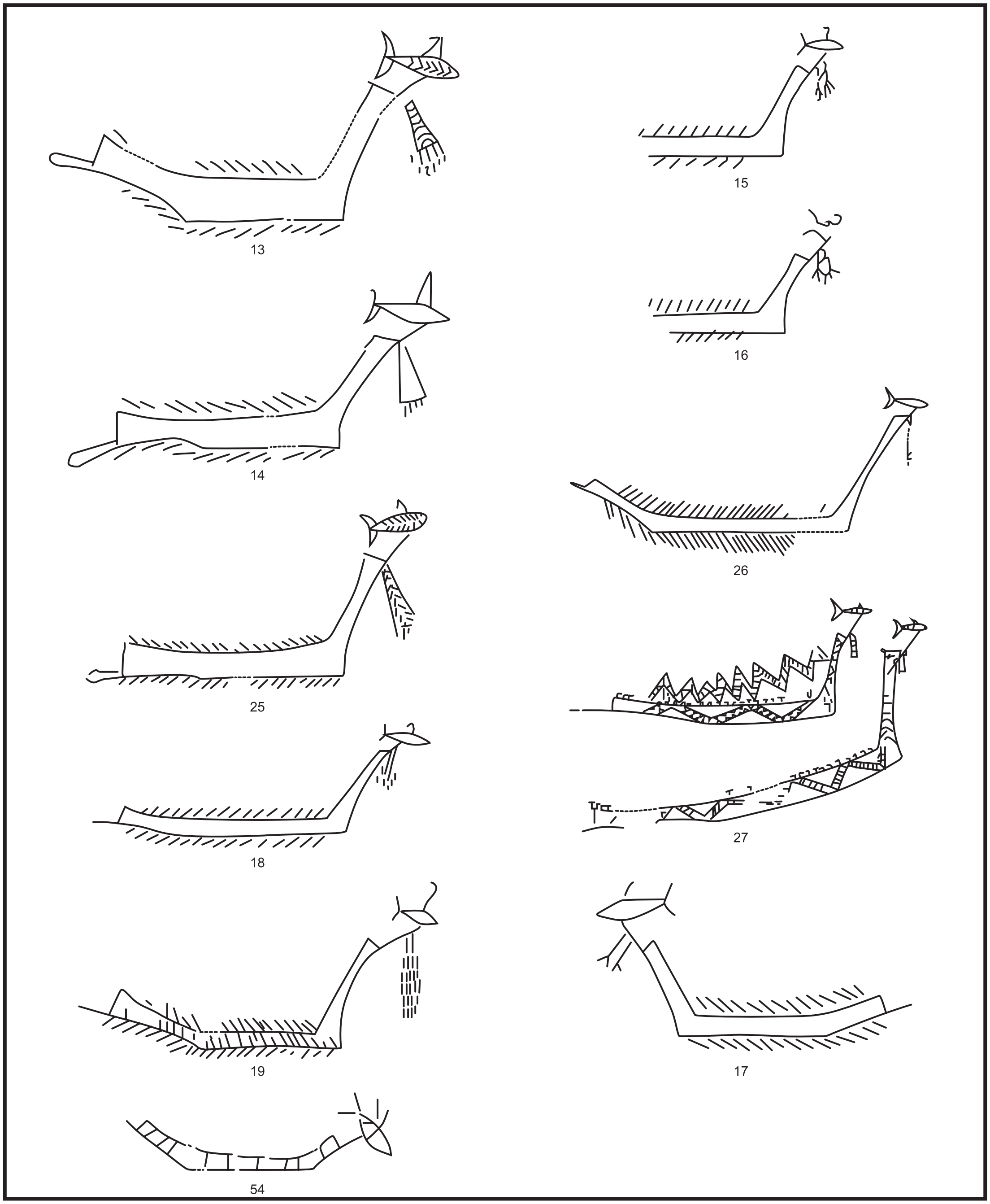


Figure 5.33 Incised boat depictions on Cycladic ‘frying pans’ (Coleman 1985: Fig. 5). (drawing by R.M. Economakis). With permission from J. Coleman and American Journal of Archaeology and Archaeological Institute of America.

day; reaching the mainland coasts of the Aegean Sea required multi-day voyages. It was these long-range ventures, Broodbank reasoned, that made the ‘international spirit’ possible. With much of the room taken up by the rowers, Broodbank believes that longboats were used for war, trade of prestige goods or ceremonies rather than bulk cargo transport. The appearance of deep-hulled sailing ships occurred at the end of the 3rd millennium BC and initiated major change in the Middle Bronze Age (2000a).

6

THE MINOANISED ISLANDS

The Middle and early Late Bronze Age

From the Middle Bronze Age onwards the Aegean islands (as well as the coastal region of western Anatolia and sites on the Greek mainland) became increasingly drawn into the Cretan sphere of influence. The first tentative signs of influence are generally dated to the Middle Minoan IB/II period and gradually increase over time – peaking in the late Middle/early Late Bronze Age period when archaeologists can point to numerous parallels in material culture, architecture, frescoes and writing between Crete and the islands. This increasing adoption of Cretan features, technologies and practices is called 'Minoanisation'. Following a synthesis of settlement patterns, architecture, burial practices and key artefact categories, this chapter then summarises the archaeology and material culture of individual sites to aid our understanding of the Minoanisation process at the local level. These site summaries form the foundation for the long-debated Minoanisation models which are explored in the 'Contextualisation' section.

SETTLEMENT

Until recently, scholars knew relatively little about the Middle Bronze Age. Recent archaeological research has transformed our state of knowledge, at least for the Cyclades where settlements have now been discovered on most of the islands. The current absence of evidence of Middle Bronze Age occupation on Seriphos, Kimolos and some of the smaller Cyclades more likely reflects insufficient survey work rather than actual absence of settlement. The traditional view of this period was that of population nucleation into a single major island centre following the dispersed settlement pattern of the Early Bronze Age. Recently, however, scholars have drawn attention to much more diverse and island-specific settlement patterns. While a number of Cycladic islands conform to the single-site stereotype (Kythnos, Tenos, Pholegandros, Anaphe), Kea, Andros, Siphnos, Ios and possibly also Delos and Paros each have two sites, Melos has a possible six sites, Naxos has eight, Thera and Amorgos each four;

and some islands maintain the dispersed settlement pattern of predominantly minor sites typical of the Early Bronze Age (27 sites on Syros, 13 on Mykonos) (Sotirakopoulou 2010) (Figure 6.1). The Middle Bronze Age settlement pattern in the Cyclades thus should be considered variable and contingent upon each island's history.

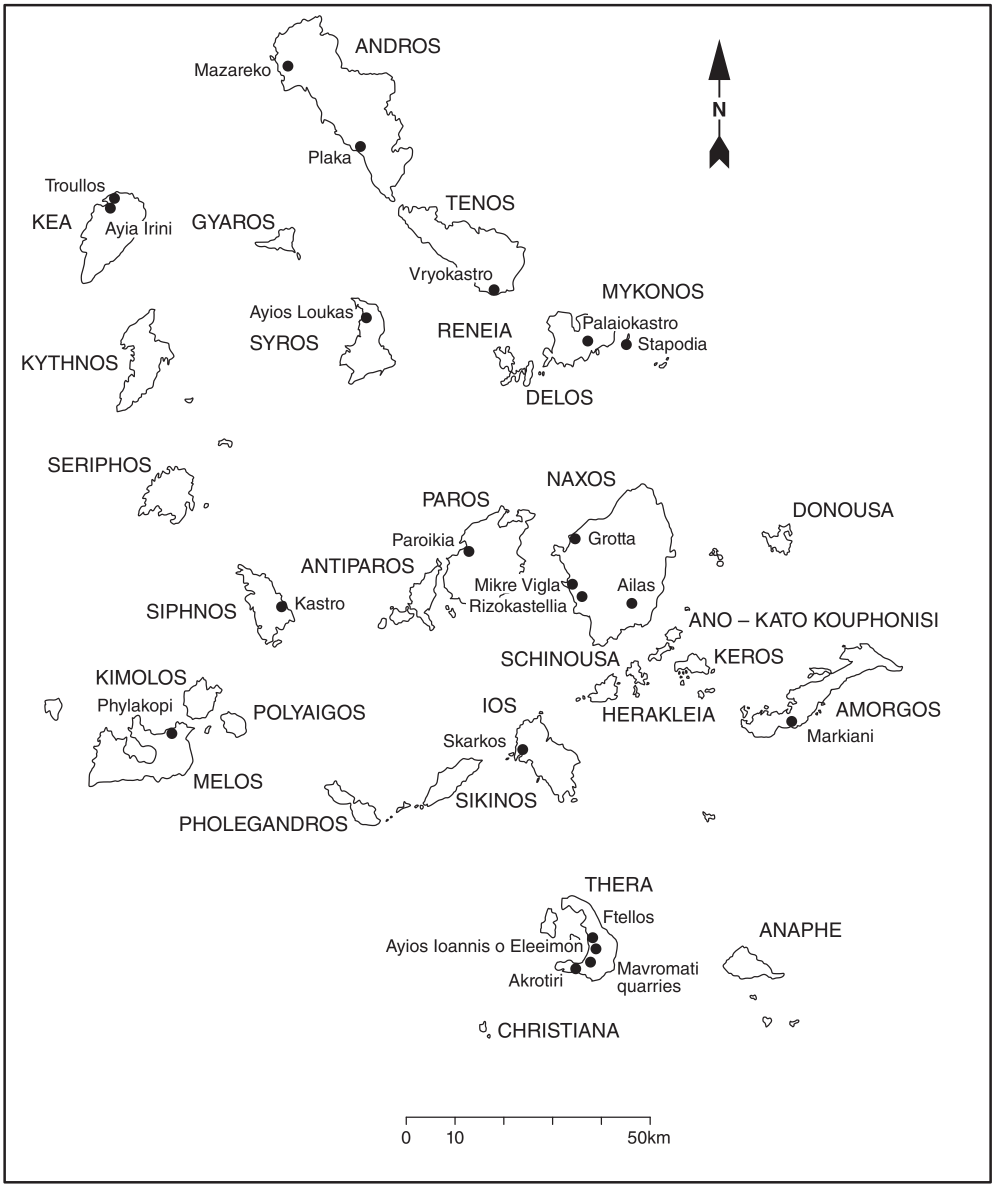


Figure 6.1 Key sites in the Cyclades (after Sotirakopoulou 2010: Fig. 1).

Settlements appear to have been long lived in the Cyclades and settlement locations were unexpectedly stable through time. This is demonstrated clearly by Sotirakopoulou (2010: 829) who calculated that 64% of all Middle Cycladic sites were built on an Early Bronze Age (or even Neolithic) habitation, and 45.5% of these sites continued to be inhabited in the Late Bronze Age. The choice of settlement location during all time periods appears to have been influenced in almost equal measure by a need for defence, a desire for access to fertile land and proximity to the sea for trade and to supplement peoples' diets: "settlements were almost equally often located on hilly promontories or flat coast areas, on high or lower hills situated some distance from the sea, and on hills situated in the hinterland of the islands" (Sotirakopoulou 2010: 829). Infrequently, sites can also be found in flat coastal stretches or on hilly islets. That defensibility was a major concern is easily deduced from elevated locations on inaccessible promontories or hills. Where settlements were located by the coast, fortifications were built for protection. For example, Ayia Irini on Kea was fortified throughout the Middle Bronze Age and Phylakopi may have had a scaled-down version of its extensive Late Bronze Age fortification system (Overbeck 1989; Renfrew et al. 2007a).

The best known Middle Cycladic sites are Phylakopi on Melos, Ayia Irini on Kea, Paroikia on Paros, Mikre Vigla and Grotta on Naxos, Akrotiri, Phtellos and Mavromati on Thera and Plaka on Andros (Hadjianastasiou 1993). However, only Phylakopi has revealed concrete details about settlement architecture and layout (Figure 6.2). The Second City at Phylakopi was of considerable size and well planned: its streets were oriented along a north-south and east-west axis and divided the town into housing blocks. Each house, in turn, consisted of two to four rooms, sometimes with the addition of a courtyard or open space. The house walls were constructed of rubble, though crude ashlar masonry is visible in places (Renfrew et al. 2007a; Atkinson et al. 1904). The architecture of Ayia Irini IV and V is not as well known as much of it was destroyed by later buildings and by a large destruction at the end of the Middle Bronze Age (Overbeck 1984; Davis 1986). Only a few rooms survive at Paroikia, but these indicate they were tightly clustered and well-built structures (Overbeck 1989). Mikre Vigla has been explored through a surface survey which revealed substantial architectural remains. The structures appear to have been small houses and terraces made of rubble and, sometimes, larger boulders; at least one building had walls decorated with painted plaster (Barber and Hadjianastasiou 1989). Architecture at Grotta remains elusive, but the presence of a settlement is confirmed by large quantities of Cycladic, Helladic Matt-Painted and Grey Minyan pottery (Hadjianastasiou 1993). Excavations at Plaka on Andros have revealed an Early to Middle Cycladic settlement with carefully constructed house walls (Sotirakopoulou 2010: 831). While excavations at Akrotiri have uncovered substantial artefacts of the Middle Bronze Age date, the town layout and architecture is not yet fully understood. It is clear, however, that Akrotiri was already an established settlement with its own distinct layout and with houses up to two-storeys high (Doumas 1983; see Chapter 7 for more details).

As regards the northern and eastern Aegean islands, settlement evidence is considerably less comprehensive and our understanding of settlement patterns much less well developed. On Kos, a substantial Middle Bronze Age settlement with large buildings and fortifications underlies the extensive LBA town of Serraglio and appears to have acted as the focal point of a nucleated settlement pattern. In contrast, Karpathos, Kasos and Saros are characterised by multiple sites many of which are new foundations

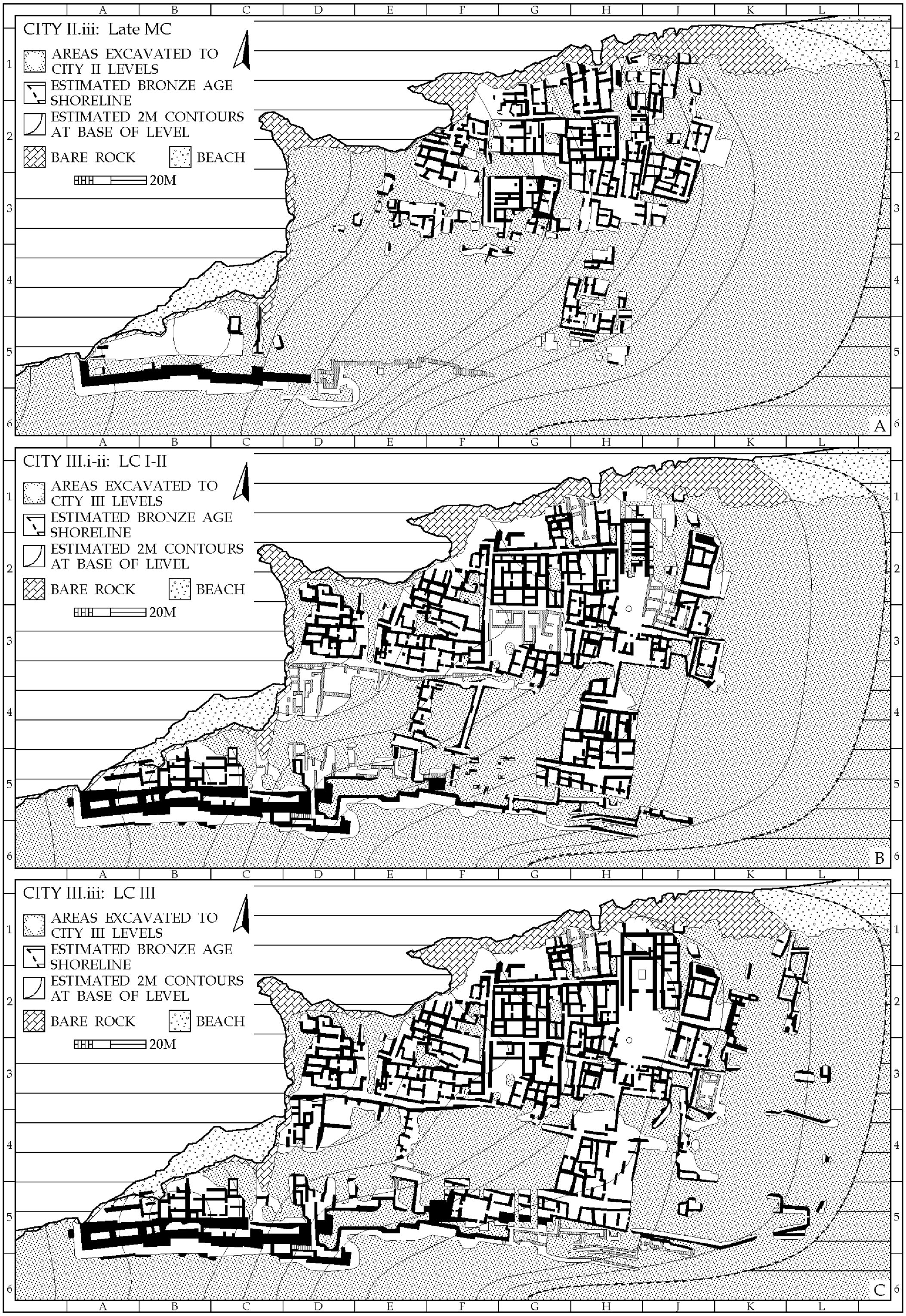


Figure 6.2 The settlement of Phylakopi through time (Whitelaw 2005: Fig. 1). Image courtesy T. Whitelaw.

that continued into the LBA. On Rhodes, Middle Bronze Age remains were originally limited to the area around Phileremos and Trianda, but recent excavations are revealing ever more finds also in other parts of the island and provide ever-increasing evidence of a dispersed settlement pattern. Following a dispersed EBA settlement pattern with Poliochni as a leading site, Koukonisi on Lemnos, with its coastal, twin harbour location, became the most important settlement in MBA. As is also the case in the Cyclades, these flourishing well-organised major towns reveal considerable Minoan influence in architectural features (e.g. polythyra) and artefacts (esp. imported and locally made Minoan pottery) during the early LBA.

BURIALS

Compared with the Early Bronze Age, burial evidence is relatively sparse in the MBA. While jar burials have been found on Rhodes, most of the more substantial evidence comes from the Cyclades where rock-cut chambers, cist graves, and infant pot burial practices continue into the Middle Cycladic period (Sotirakopoulou 2010: 831–832). Nevertheless, the number of known sites remains small apart from substantial cemetery remains from Ayia Irini on Kea where three extramural cemeteries contained almost 25 pit graves, jar burials and cist graves dated to the site's Middle Cycladic Period IV (Overbeck 1989). Cist graves continue the Early Bronze tradition and can be divided into those constructed of large slabs and those built of stone (Figure 6.3). In addition, two cist graves and one intramural burial are dated to Period V. Unlike earlier examples, graves mainly contained the bones of children and infants; adult burials were rare. The dead were normally buried individually in a contracted position, although multiple burials did also exist. In four instances, stone-built platforms were associated with graves or the cemetery cluster more generally. Only 50% of graves contained offerings – often only a single object. Pottery was by far the most popular grave good type, but metal jewellery, stone jewellery, sealstones, stone vases, spindle whorls and a figurine head occasionally found their way into the graves (Overbeck 1989). Many of these high-value items come from Graves 8 and 24, two larger stone-built tombs that contained "three gold diadems, beads of gold and semi-precious stones, gold rings, as well as pins and rings of bronze, silver and possibly lead" (Sotirakopoulou 2010: 833).

There is very limited burial evidence for the late Middle and early Late Bronze Age period. Only four cemeteries are known (Ayia Irini on Kea, Ailas on Naxos and Skarkos on Ios, Trianda on Rhodes). Of these, Ayia Irini's cemetery evidence is the most substantial for the earlier Middle Bronze Age. The late Middle Bronze Age (Period V) is represented by two cist graves only, demonstrating the continuity of this burial type. Evidence from Period VI (early Late Bronze Age) is only marginally more plentiful and shows broad continuity in grave types. They include three jar burials, one cist grave (without platforms) and three large stone-built tombs (28, 29 and 30) that continue from Period IV. The excavator reported that the tombs had been looted of their contents except for ten clay vases – several of which imitated Minoan types – that were uncovered from tomb 29 (Overbeck 1989). Similar Minoan influence has been detected among the grave goods from one of the two cist graves at Ailas which contained eight imported or locally made Minoan cups. The other grave held bronze metal tools (Marthari 2009: 43–44).

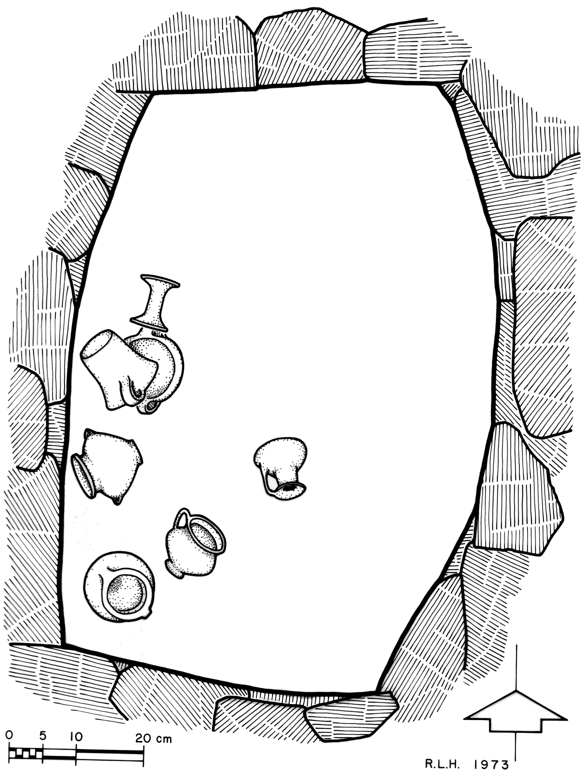


Figure 6.3 Cist grave (Grave 24) built of stone with grave goods in situ, Ayia Irini cemetery (Overbeck 1989: Plate 22b). Image courtesy of The Department of Classics, University of Cincinnati.

Excavations of Skarkos have brought to light two grave groups in the area of the Early Cycladic settlement. Grave Group 1 consists of four child jar burials (Figure 6.4) and two pit burials (nos. 1–6). Two jar burials and two pit graves (nos. 7–10) make up Grave Group 2. Only one jar burial (no. 4) was preserved in situ. It contained the skeleton of a girl whose hair had been secured with a bronze hairpin. The Minoanising jug and cup set suggests a date late in the Middle or early in the Late Bronze Age. Grave no. 7 was particularly rich as the finds scattered around it indicate. They include a faience bead, bronze objects (a punch, a pair of tweezers, a razor blade) and clay pots. The two imported Minoan cups date its use to the late Middle or early Late Bronze Age. The presence of a small cooking pot, two conical cups (one filled with animal bones) and traces of fire near grave no. 4 and further cooking pot remnants near grave no. 7 may hint at the enactment of ritual practices such as food offerings or funerary meals (Marthari 2009). The LB IA cemetery at Trianda is poor in both architectural and artefactual remains. The deceased were buried in sand pits, jars or, very rarely, in cist graves. More notable is the horse skeleton that was found associated with a human burial. It represents the earliest such burial in the Aegean islands (Marketou 2010: 783–784).

Figure 6.4 Grave 3, Skarkos on Ios. Jar burial of early LBA (Marthari 2009: Fig. 8). With permission of The Danish Institute at Athens.

RELIGION

Evidence of the religious sphere is visible at many sites, though both architecture and portable finds have invariably been interpreted with reference to Minoan religious practices. There is little doubt that Minoan iconography and objects have been incorporated, but whether this represents an adoption of a belief system or merely a superficial veneer remains unclear. At Ayia Irini, the ‘Temple’, a public shrine located just inside the main gate of the town, has been excavated. In its final design, the ‘Temple’ is a rectangular structure arranged in a linear sequence of large rooms with sub-divisions or annexes (Rooms 1–6) (Figure 6.5). It came into being early in the Middle Bronze Age (Period IV) and stayed in use, with interruptions, until Hellenistic times (Caskey 1998). The original building design, consisting of Rooms 1 and 2, was square. It is only late in Period IV that the building was enlarged to its current size. The most important section of the Temple appears to have been Room 1 which was entered via a marble step and contains several built stone platforms on which a large number of clay statues were found. Other important features are the multiple benches found in Rooms 3 and 6; being rather narrow, they are interpreted as votive platforms rather than for sitting. Successive layers of burning in Room 6 may suggest some sort of sacrifice or hearth. Infrequent remains of Grey Minyan drinking cups and duck vases have been interpreted as offerings or ritual drinking/libation vessels. Some minor building work took place in the early Late Bronze Age, but the Temple’s design essentially remained unchanged (Caskey 1998).

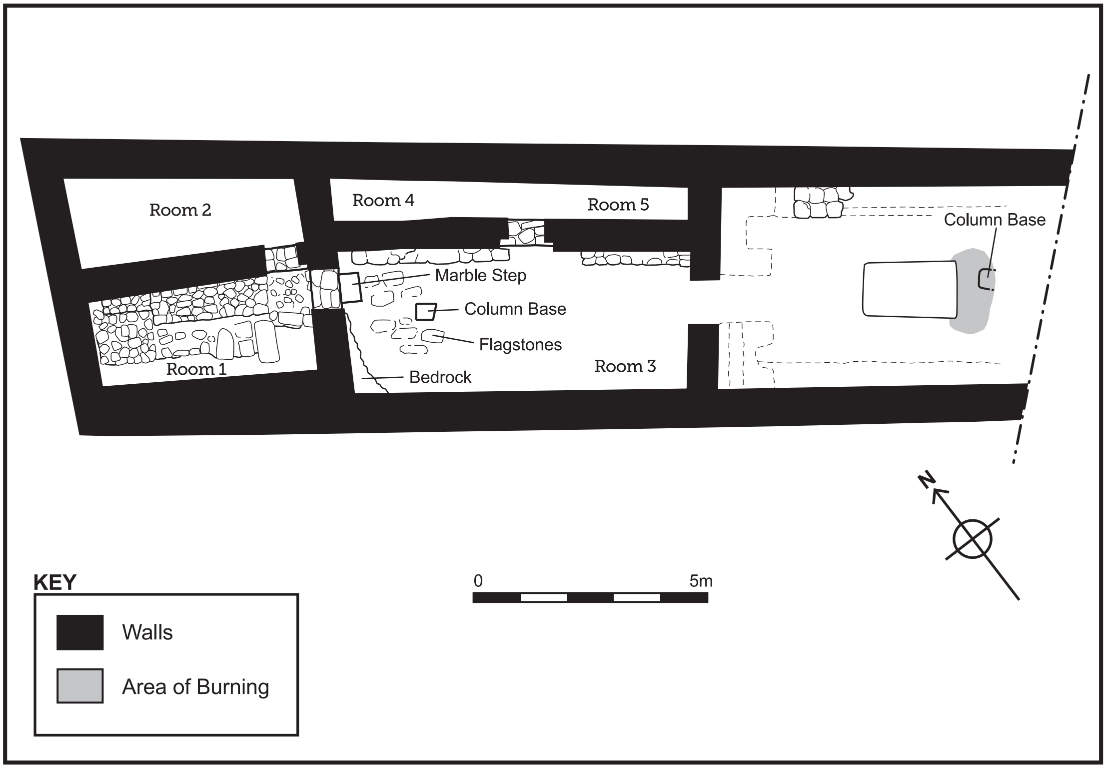


Figure 6.5 Plan of the Temple at Ayia Irini in MBA (after Caskey 1998: Fig. 3).

Its most remarkable finds are the approximately 55 large statues formed of local clay that were predominantly found broken and buried in Room 1 and are dated to the Late Cycladic I–II periods. The statues depict upright heavy-breasted women dressed in flouncing Minoan skirts (Figure 6.6). Their hands are placed on their hips and they wear garlands or jewellery; traces of red and white remain visible on one figure. In contrast to the typically small Cretan figurines, these figures are distinctly un-Minoan in their size (60 cm to life-size). It remains uncertain whether these female figures represent deities or adorants, though scholars consider them more likely to have been essential cult equipment, namely votaries celebrating the epiphany of a divinity (Caskey 1986). It is uncertain how the statues would have been displayed, but they are likely to have stood on platforms and the floor. The existence of repair marks and the fact that statues appear to have been produced in groups, with new statue sets added to the existing collection at intervals, indicates that they were greatly valued and important to the performance of rituals. Because of the continuity in use of the building, the lack of an abrupt change in architecture or location, an absence of essential Minoan ritual equipment or iconography and the uniqueness of the terracotta figurines, Caskey considered the ‘Temple’ as an expression of distinctly Cycladic worship and ritual (1986: 38; 1998: 128).

Troullos on Ayia Irini, Mikre Vigla on Naxos, Philerimos on Rhodes and Ayios Georgios on Kythera have been interpreted as shrines or even Minoan-style peak sanctuaries (Peatfield 1983: 273 no. 1; Rutkowski 1986: 211; Sakellarakis 1996: 93). Investigations at Troullos, a hilltop 65 m high and 500 m

Figure 6.6 Female clay statue from the Temple at Ayia Irini, Room 1 (Caskey 1986: Plate 4a). Image courtesy of The Department of Classics, University of Cincinnati.

northwest of Ayia Irini, brought to light a small enclosure (12 x 15 m) attached to a single-roomed house. The northern part of the enclosure was paved with local marble and plaster flooring. Two enigmatic cylindrically shaped structures of 5 m and 6 m diameter respectively were constructed of rough stone. Small finds included fragments of an Early Cycladic marble figurine and a few fragments of Middle Bronze pottery, but the majority of finds date to the Late Bronze Age: pottery (conical cups and tripod cooking pot legs), strips of bronze, some obsidian, a stone ladle and two stone libation tables. A male Minoan-type bronze figurine was found on the surface of the site. The excavator considered Troullos to have functioned as a watchtower (Caskey 1971: 392–395).

In 1985 a surface survey at Mikre Vigla promontory unearthed evidence of a prosperous site occupied from Early Bronze Age I to Late Bronze Age IIIC (Barber and Hadjianastasiou 1989; Hadjianastasiou 1993). Most of the pottery was of local type and was mainly dated to the late MC/early LC I period. Melian vases represented the most numerous imports, followed by Minoan and Mainland vessels. In addition, loomweights, one piece of bronze and fragments of monochrome plaster were discovered. About 140 fragments of locally made terracotta figurines gave rise to the interpretation of a domestic or public shrine (Barber and Hadjianastasiou 1989), though Sakellarakis reinterpreted the evidence as a Minoan-style peak sanctuary assemblage (1996: 95–98).

Philerimos on Rhodes is a mountain ca. 270 m high. Original excavations uncovered some Middle Minoan vases and stone vessels. Although no figurines have come to light, the presence of an incense burner, loomweight, and stone offering table led Sakellarakis to interpret the site as a peak sanctuary (1996). Further locations with Middle Bronze Age finds have since come to light on the mountain, but the nature of these sites is more similar to domestic assemblages. The first ritual associations may be visible from Late Bronze Age I onwards where finds include two bronze adorants (Marketou 2009: 73–76).

Ayios Georgios on Kythera, on the other hand, is considered an undisputed example of a Minoan peak sanctuary. The site is located on a mountain top 350 m above sea level and 4 km northeast of Kastri. Excavations revealed no architectural structures, but many finds typical of peak sanctuary assemblages. They included over 80 male and female bronze figurines in typical adorant poses, votive hands, legs and feet, as well as bronze scorpions (Figure 6.7). Unusual in this instance is the use of bronze for the manufacture of figurines; on Crete, figurines are almost always made of clay. Other finds include metal votive weapons and jewellery, beads made of semi-precious stones, an oxhide ingot fragment, melting debris, stone vases (among them a steatite ladle with Linear A inscription), stone and clay offering

Figure 6.7 Female and male bronze figurines from the peak sanctuary of Ayios Georgios on Kythera (Sakellarakis 1996: Plates 14c and 15a). Image reproduced with permission from E. Sapouna-Sakellarakis.

tables, miniature horns of consecration and a small bronze votive double axe alongside plentiful Middle to Late Minoan IB pottery (e.g. conical cups, incense burners, juglets, tripod cooking pots) (Sakellarakis 1996, 2011; Sapouna-Sakellarakis et al. 2012).

Architectural features, small finds and iconographic programmes of wall paintings provide additional insights into ritual practices and beliefs; for the most part they seem to be based on Minoan traditions. Architectural features include the Minoan-style lustral basin that is sunken into the ground and is entered via an L-shaped step arrangement. Originally believed to have been bathtubs, context and small finds rather indicate that they were associated with rituals of initiation and purification (Hitchcock 2000: 163–179). At Akrotiri, a lustral basin has been recognised in Xeste 3 where associated wall paintings appear to reference initiation rites (see Chapter 7). Pillar rooms, like those known from Phylakopi and House A at Ayia Irini, are also known from Crete where they are considered architectural representations of sacred stalagmites and stalactites found in caves and/or repositories for ritual equipment (Hitchcock 2010: 195). However, it is worth to reminding ourselves that pillars or central columns have regularly been used in the islands to support large ceiling spreads; whether or not such a room may have held religious connotations may depend on its location within the building and the finds associated with it. Portable finds that point towards ritual practices include offering tables, horns of consecration, libation vessels and drinking vases more generally; they are best evidenced at Akrotiri (see Chapter 7).

POTTERY

Pottery styles and shapes developed out of the EBA and followed, broadly speaking, regional traditions with the Cyclades, Dodecanese and northeastern islands, separated into distinct cultural assemblages often with strong ties to the adjacent mainland repertoires. As time progresses, Minoan influence upon these regional traditions becomes ever stronger and leads to the development of a shared Minoanising culture across the Aegean.

In the Cyclades, three pottery wares were particularly popular during the Middle Bronze Age. They are Dark Burnished, Cycladic White and coarse local fabrics (Figure 6.8). Often burnishing covers the entire vessel, but it can also be found in combination with paint. Cycladic cups, for example, normally have a white painted rim with red painted decoration and a red burnished body. Other typical shapes are barrel or ovoid jar, and bowls with incurved or triangular rims. Burnishing was particularly common in the early stages of the Middle Bronze Age, but waned towards the end of the period as potters invested less time and labour and simply applied a dull coat of paint. While not the most popular export, Red Burnished cups or goblets have been found at Athens, Brauron, Korakou, Argos, Lerna and Kolonna. Of particular interest is the use of Dark Burnished wares for the imitation of Grey Minyan shapes that were popular imports from mainland Greece. Grey Minyan itself is an imitation of metal vessels with sharply angled profiles and a dark metallic-looking burnished finish; typical shapes are the kantharos and ring-stemmed goblet (Barber 1987, 2007; Davis 1986; Overbeck 1984).

Cycladic White (Figure 6.8c) is an easily recognisable and rather attractive ware that, due to its colourful naturalistic designs, became a popular export in the Middle Bronze Age. Fragments of a

a)
b)
c)

Figure 6.8 Typical pottery wares at Phylakopi: a) painted coarse local cup, b) Dark Burnished Melian bowl with pattern painted rim, c) Cycladic White jug. Images courtesy of the Trustees of the Ashmolean Museum.

few MBA Cycladic White beaked jugs or jars have been uncovered at Knossos, Eleusis, Lerna, Asine, Eutresis, Kolonna and Dramesi (Berg 2000: Appendix). This colourful ware continues to be produced into late MBA: at Knossos, over 40 Cycladic vases have been found in the Temple Repositories, a few sherds come from Kommos and four vases from Pyrgos. Black and red wares are also popular at Greek mainland sites, such as Athens, Brauron, Marathon, Thorikos, Korakou, Lerna, Asine, Midea, Tiryns and Kirrha (Berg 2000). The fabric is white to pale grey in colour and ranges from extremely fine to coarse. Requiring white caolinite clays, only Melos and Thera could have provided the necessary chalky clay for this ware. Designs were painted in red and black on the white clay surface (often referred to as the 'Black and Red' style). Motifs develop from a more abstract curvilinear style (in some cases derived from Cretan prototypes) to a more naturalistic style with floral and figurative (especially bird) motifs in the later Middle Bronze Age. Common shapes include the characteristic Cycladic beaked jug, panelled cup and Cycladic bowl. However, it was also used at times for imitations of Minoan shapes, such as hole-mouthed or bridge-spouted jars (Barber 2007; Davis 1986; Overbeck 1984).

Local fabrics vary from island to island and normally range from semicoarse to very coarse (Figure 6.8a). The fabric colour and composition depends on the clays utilised: On Melos, the fabric varies in colour from light brown to orange or red with abundant volcanic inclusions. Kean pottery is typically dark red with prominent micaceous inclusions. Naxian fabrics are red to orange in colour with micaceous inclusions, while Parian clay extends across the full brown to red colour range and contains mica (Berg 2000: 92–106). While many shapes continue local Cycladic traditions and relate to forms already known in other fabrics, towards the end of the Middle Bronze Age the repertoire expands to include shapes of Minoan origin, such as the semi-globular cup, straight-sided cup, oval-mouthed amphora, tripod vessel and bridge-spouted jar (Barber 2007; Davis 1986).

In the Dodecanese, the Middle Bronze Age repertoire also developed from the local EBA tradition. Popular shapes are carinated cups, high-necked jugs and incurving bowls. Anatolian elements are clearly visible in the red-slipped surface treatment and ceramics shapes, such as the carinated cup and large carinated stemmed bowl (Marketou 2010). In the northeastern Aegean, too, the MBA pottery is rooted in the EBA repertoire, often with strong ties to Anatolian (esp. Troy) traditions. Intriguing is Samothrace's adoption of the potter's wheel for the manufacture of hemispherical bowls at the beginning of the MBA when most other sites still produced pottery by hand (Girella and Pavuk 2016).

Broadly speaking, the Middle Bronze Age shape repertoire continues into the Late Bronze Age. While some shapes follow the local tradition, many others are imitations of Cretan pottery (e.g. conical cup, Vapheio cup, bridge-spouted jug or jar, stirrup jar, tripod cooking pot) and others still are hybrid vessels inspired by Cretan designs. In the Cyclades, the popularity of dark burnished wares wanes in favour of plain or pattern-painted decoration. Cycladic White continues to be a valued commodity. Decorative motifs are by now largely drawn from Minoan prototypes, such as spirals, tortoise-shell ripple and reeds, although some local preferences shine through, such as the use of birds, fish motifs and, more generally, the use of the Black-and-Red style in the Cycladic repertoire (Davis and Cherry 2007). Some Minoanising styles become highly valued trade items in their own right, such as the Dark-on-Light and Light-on-Dark vessels made on Kos during Late Bronze Age I.

While all islands were linked into *local* ceramic exchange networks, the degree to which they participated in *regional* interactions waxed and waned over time and varied between sites (Berg 1999, 2007a). Often these relationships appear to have been extensive, but not necessarily intensive. For example, Cypriot pottery has come to light on Thera and Melos, Syrian pottery at Akrotiri, Melian pottery on Kea, Naxos and Thera, Theran vases on Melos and Kea, Koan Dark-on-Light or Light-on-Dark in Cyprus, Anatolia, the Dodecanese, Crete and the Cyclades, southern Aegean pottery on Lemnos, and Kytheran Lustrous Decorated on the Greek mainland and Aegina (Berg 2000; Boulotis 2009; Marthari et al. 1990).

By far the most important of these imports were the ubiquitous Minoan vases that found their way to the Aegean islands. Generally speaking, Minoan imports began to make their appearance in MM IB/II, increased steadily over time and peaked in MM III/LM IA. Ceramic specialist at Ayia Irini, for example, pronounced Minoan (and Minoanising) imports "abundant" in the late MC period – only outnumbered by the local production (Davis 1986: 6). Minoan vessels can be divided into fine and coarse categories, the former mainly belonged to wheel-thrown serving vessels while coarser fabrics were reserved for transport shapes. Cretan imports spurred on the imagination of the local potters who produced copious imitations to meet the local demand. As Berg (2007a, 2007b) has demonstrated for Phylakopi, the adoption of Minoan pots went hand in hand with the adoption of the entire Minoan package that mirrored Cretan products in all facets. These modifications included a new forming technique (the potter's wheel), a new fabric look (a pale slip to imitate the pale Cretan clays) and the use of entirely new shapes (e.g. conical cups, bridge-spouted jars, tripod cooking pots) that hint at the appropriation of new drinking and eating practices. This appropriation was not entirely comprehensive and hybrid vessels are often observed. The production of Minoan-style rhyta – libation vessels used in ritual contexts – suggests that this cultural influence was at times much more than a superficial imitation of fashion trends and may have fundamentally changed a community's tradition and cosmology. Obviously, sites differed in their openness towards Minoan ceramic features and technologies. Potters at Ayia Irini, for example, were less rigid in their utilisation of the wheel which was used for both local and Minoanising shapes (Gorogianni, Abell and Hilditch 2016). Nevertheless, the general pattern of increasing Minoanisation is apparent on virtually all the Aegean Islands (Berg 2007a; Gorogianni, Pavuk and Girella 2016). The theoretical underpinnings of the 'Minoanisation' phenomenon are discussed further in the 'Contextualisation' section. From the late Late Bronze Age I period onwards, Mycenaean vessels gradually replace Minoan ones and herald the beginning of 'Mycenaeanisation' (see Chapter 9).

The second most common ceramic import category are mainland Grey Minyan vases which were particularly popular in the Cyclades at the beginning of the MBA and then gradually declined. Imitating metal vessels, characteristic imported shapes include the kantharos, goblet, and bowl. The ware exerted great influence on Cycladic pottery in general, as is visible in the adoption of the burnished ware and of several shapes related to Grey Minyan (Berg 2007a: Chapter 5; Barber 2007; Overbeck 1984). In contrast, Greek mainland Matt-Painted and Lustrous Decorated imports were comparative rare. Anatolian red-slipped wares are commonly found in the islands in the northeastern Aegean where also Cycladic, Aeginetan and other southern Aegean imports have been found. In contrast, mainland imports appear to be uncommon in the northeastern Aegean.

Potter's wheel

The first appearance of the potter's wheel dates back to the EH IIB and III periods on the Greek mainland. On Crete, the wheel was first known in the MM IB period, though experimentation with a rotating device can be demonstrated already in EM III/MM IA. From the evidence that survives, we know that wheelheads – the most notable surviving part of a potter's wheel – were large round clay discs of between 4 and 10 kg in weight. Examples have come to light from late MC contexts at Phylakopi, Ayia Irini and Akrotiri. Their design mirrors that of Cretan potter's wheels and it has therefore been argued that Cretan potters introduced this new technology to the Cyclades. The adoption impetus was likely different for northern and eastern islands, such as the early MBA wheel use documented for Samothrace, which had easy access to wheel technologies practiced in Anatolia. Detailed ceramic studies at Phylakopi and Ayia Irini have demonstrated the gradual expansion of wheel-throwing from late MC to LC I as potters became ever more familiar with the technology. For the most part, the wheel was utilised for small to medium-sized open shapes which could easily be thrown in one sequence. Large vessels continued to be manufactured by hand or with hybrid methods. The association between the potter's wheel and Minoan Crete is particularly strong at Phylakopi where wheel-throwing was applied predominantly to Minoanising shapes. Keian potters, in contrast, used the wheel for a much wider range of vessels that included both Minoan and local shapes (Berg 2007a, 2007b; Gorogianni, Abell and Hilditch 2016). The rapid and ready adoption of the potter's wheel throughout the Aegean should be viewed in line with other Minoanising trends and signals a desire by communities to participate in popular fashions, but also potential emulation of new Minoan-inspired drinking, eating and cooking practices.

FRESCOES

Frescoes are best known from Akrotiri on Thera, and are discussed in detail in Chapter 7. However, fragments of miniature friezes and large-scale wall paintings have also come to light from Ayia Irini on Kea, Phylakopi on Melos and Trianda on Rhodes, and demonstrate that this craft was practiced in many island communities. Although the technique of *buon fresco* painting appears to have been adopted from Crete, the iconography and themes are Cycladic in nature and represent a shared repertoire (Morgan 1990). Unlike Akrotiri where naturalistic frescoes have been uncovered in every house, only a few buildings have revealed such wall paintings at Ayia Irini. House A and the North-East Bastion contained the "Bluebirds frieze" and a miniature frieze respectively (Abramovitz 1973, 1980; Morgan 1990). At Phylakopi, the famous "Flying Fish" fresco comes from the Pillar Crypt. No other wall paintings have been found in situ, but stray finds from various excavation trenches and a miniature frieze fragment in a rubbish dump outside the town hints at a much more widespread use of frescoes on Melos (Bosanquet 1904a: 70–79; Morgan 1990: 252, 2007).

Two types of wall paintings can be distinguished: miniatures and large-scale paintings. The main theme of miniatures appears to be outdoor gatherings, possibly ritual festivals. At Ayia Irini, scholars have identified several themes:

1) a landscape with river, marsh, plants and rocks with a large multi-storied building with windows in the background, 2) ship fragments reminiscent of the famous ship procession from Thera, 3) a procession of dancing men, and 4) a landscape scene with dogs chasing deer. A separate fragment depicts a hunter with helmet and spear and fragments of a chariot and horses (Morgan 1998). The fragment from Melos depicts a man's leg, but is too small to draw any conclusion about the iconographic programme (Morgan 1990, 2007) The "Bluebirds frieze" is the most important large-scale painting at Ayia Irini. It shows at least 22 blue birds, identified as rock doves, standing on a sandy surface set within a landscape of rocks and plants (Coleman 1973; Abramovitz 1980). The depiction of nature is also a major theme among the frescoes from the Pillar Crypt at Phylakopi where a fragment of a blue monkey, lilies and the well-known "Flying Fish" frieze were found (Morgan 2007). The "Flying Fish" frieze shows beautiful blue and yellow flying fish and rocks set off against a white background (Bosanquet 1904a: 70–79) (Figure 6.9). Flowers, in particular lilies and unspecified yellow flowers, as well as figurative scenes are known from Trianda on Rhodes (Davis 1990: 225; Marketou 2009). Figurative art, namely fragments of two women, is only represented at Ayia Irini. Based on the robing ceremony in the House of the Ladies at Akrotiri, Morgan has reconstructed the scene as showing a seated woman, presumably a goddess, with a garment in her hands that she received from a woman standing opposite her (1990, 2007).

Figure 6.9 Flying fish fresco from Phylakopi (inv. no P5844). Image with permission from the National Archaeological Museum, Athens/Department of Collection of Prehistoric, Egyptian, Cypriot and Near Eastern Antiquities.

METALS

The broader picture of metal production across the Eastern Mediterranean shows that metal implements were common in the Middle Bronze Age, but that their quantity, range and variety greatly increased in the Late Bronze Age. However, stone, bone or wood remained cheap and perfectly functional alternatives to metal tools, especially in the agricultural realm. It is particularly in the area of carpentry and masonry where cutting capabilities of metal offered a great advantage over existing alternatives and led to a rapid growth in these industries in the 2nd millennium BC. The most common metal tools were used for carpentry and masonry (e.g. axes, adzes, chisels, drills, saws), followed by utilitarian/personal objects (e.g. knives, razors, scrapers, spatulas, cleavers), small craft tools (for leather working, textile production, basketry, engraving, glyptic, writing, etc.), agricultural tools, metalworking implements and ritual items (Blackwell 2011).

In contrast to buoyant metal tool use on Crete, finds from the Aegean islands are comparatively rare, although they also increase between the Middle and the Late Bronze Age. The most common tools are of utilitarian types. Among the carpentry/masonry tools, chisel and axes were common, while drills and saws – linked by Blackwell to the creation of monumental elite architecture on Crete – are rare (2011). Agricultural tool and small craft tools are small in quantities. Only five metalworking implements (3 moulds and 2 tongs) survive and signal the decline of the Cycladic metal-producing industry after the EBA as Lavrion takes over as the main metallic Greek source (Blackwell 2011).

The number of analysed lead, silver and copper samples from the Middle and Late Bronze Age is relatively small but nevertheless provides a general picture of metal trade during these periods. In contrast to the Cyclades-dominated metal production of the Early Bronze Age, Lavrion became the dominant polymetallic source in the Late Bronze Age, providing almost all lead for samples tested from Ayia Irini on Kea, Koukounaries on Paros and Akrotiri on Thera and around 50% of copper artefacts from Ayia Irini and Akrotiri (Gale and Stos-Gale 2008). Lively commercial contacts with distant regions are evidenced by the increasing influx of Cypriot and Anatolian copper. While Anatolian sources are peripheral in both periods, Cypriot copper adds up to a considerable 33%. Cycladic copper remains in limited use with 13% of analyses matching the metallurgical profile of Kythnos (Gale and Stos-Gale 2008). This pattern also applies to the Dodecanese where the 97 analysed metal objects from Rhodes and Kos reflect the dominance of Lavrion, with some minor contribution from Cyprus and the Taurus region in Anatolia (Stos-Gale and Gale 2003).

The existence of lead weights (made from Lavrion metal) is attested at several sites. Although called 'Minoan weights' in the literature, the majority of them have actually been found in the Cyclades – 102 have been reported from Akrotiri on Thera, 55 from Ayia Irini on Kea, but only 74 from all of Crete. The largest weight itself weighs ca. 15 kg and the smallest 10 g (Figure 6.10). Petruso (1978,1992) argues that this weight system was based on a basic Minoan unit of about 61 grams, with weights representing multiples of this basic unit. Taking into account erosion and wear, a more recent analysis by Michailidou (1990) suggests that the basic unit may have been closer to 65.5 grams in weight. Regardless of the precise weight unit, the presence of such lead

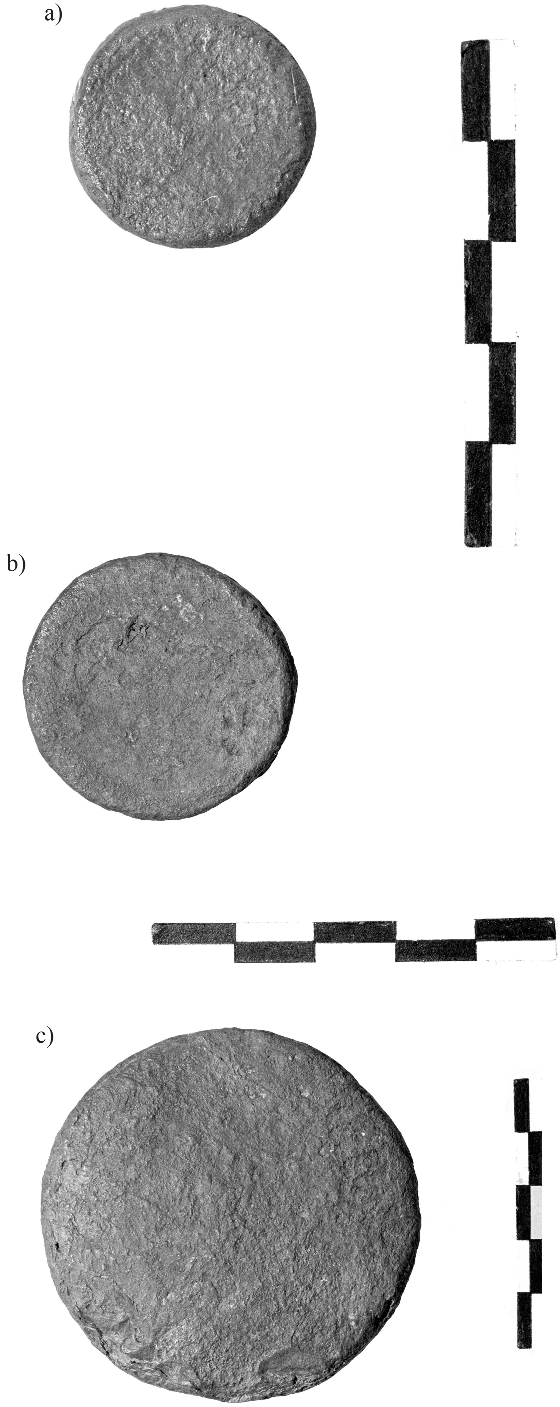


Figure 6.10 Lead weights from Ayia Irini (Petruso 1992: cat. no 11, 26, 50). Images courtesy of The Department of Classics, University of Cincinnati.

weights suggests regular trade between islands and the existence of a commonly recognised unit of exchange.

STONEWORKING

Fine stone vases have come to light at many sites. They represent both local production and imports from Crete or Syro-Palestine. That manufacture took place locally is not merely evidenced by the use of local raw materials, but also by drill cores. These waste products from the hollowing out process have, for example, been found at Ayia Irini and Koukonisi (Barber 1987: 191). Coarse ground stone tools made of local raw materials have also been discovered at many sites where they were used as grinding stones, mortars, pestles and grinders.

TEXTILES

Little is known about the islands' local textile-making tradition. The presence of pierced spools in Middle Bronze contexts at Ayia Irini and Phylakopi may hint at their use in spool racks in a horizontal ground loom or for plaiting. It is only with the adoption of the Cretan-style warp-weighted loom and the iconic discoid clay loomweights that the textile production becomes archaeologically more visible. On Crete, the warp-weighted loom had a long history, reaching as far back as the Neolithic period. The diversity of the Cretan textile production is manifest in the great variety of loomweight types which include discoid, pyramidal truncated, spherical, cylindrical, cuboid and torus. The Cretan warp-weighted loom was widely adopted outside Crete, but was used exclusively with discoid loomweights. Discoid loomweights are known outside Crete from the early Middle Bronze onwards. Key assemblages have come to light at Ayia Irini, Phylakopi, Akrotiri, Kolonna, Kastri, Serraglio, Ialysos, the Heraion, Koukonisi, Vathy Cave, Mikro Vouni and on Antikythera, Naxos and Karpathos (Cutler 2016).

The distribution of discoid loomweights across a settlement provides glimpses into the organisation of textile manufacture. At Ayia Irini, for example, loomweights have been recovered from many early LBA buildings, suggesting that textile production was undertaken by many households to meet their own needs. In contrast stands Akrotiri where large quantities of loomweights have been found at four buildings only, suggesting that textile manufacture here was a specialised and exchange-driven (Tzachili 2007). Intriguingly, by only adopting discoid loomweights, so Cutler (2016) argues, islanders restricted their textile production to dense fabrics made with finer thread types. This allowed them to weave Cretan-style multi-coloured fabrics, but does not represent the full range of finer and heavier fabrics made on Crete itself. She argues that this is a very selective adoption process which was exclusively concerned with (re)creating the colourful garments depicted in wall paintings. In contrast, Tzachili (1990) has argued that the different size categories of discoid loomweights observed at Akrotiri would permit the weaving of both finer and coarser fabrics, thus placing no limitations on the range of products that could be manufactured. In this scenario, the adoption of the Cretan technology itself seems as important – or even more important – than the end product.

ADMINISTRATION

In light of the numerous connections between the Aegean islands and Crete, it should come as no surprise to see Linear A, one of the scripts used on Minoan Crete, also in use in the islands. Still a rare occurrence in the Aegean Islands, the use of Linear A had become widespread on Crete by Late Minoan IB. First used in Middle Minoan II, Linear A documents can be divided into nonsealed documents (tablets) and sealed documents (nodules, roundels, noduli, direct object sealings). Although still undeciphered, it is clear that Linear A (alongside the short-lived Cretan Hieroglyphic script) was mainly used to keep records of agricultural and manufactured products, though a small number of sacred libation formulae have also survived (Tomas 2010; Younger 2015).

There are fragments of inscribed Linear A tablets from Ayia Irini, Phylakopi and Akrotiri as well as other objects inscribed or painted with Linear A signs from Kastri, Ayios Georgios, Akrotiri, Ayia Irini, Phylakopi, Mikro Vouni and Miletus on the Anatolian coast (Figure 6.11). In addition, the presence of seals and sealed documents at Akrotiri, Kastri and Mikro Vouni together with the plentiful evidence of lead balance weights across the Aegean suggests, at the very least, the participation of islands in

Figure 6.11 Linear A tablet from Phylakopi (Renfrew and Wagstaff 1982: Fig. 4.2). Permission granted by Cambridge University Press.

commercial trade. The presence of Linear A signs on locally produced objects, however, indicates the actual utilisation of writing and administrative practices for internal accounting purposes at Ayia Irini, Phylakopi and Akrotiri. The logograms depicted refer to wine, sheep, oil and textiles – often in considerable quantities (46 sheep, 120 units of wine and 200 textiles, for example). However, no central administrative building, archive or storage has as yet been found, and the widespread distribution of Linear A documents across the site of Akrotiri makes the notion of a centralised administration unlikely (Karnava 2008).

KEY SITES

Ayia Irini on Kea

The island of Kea lies southeast of Attica, only 20 km distance from the important metal mines at Lavrion. The island is best known for its excavations at Ayia Irini, an important fortified Bronze Age settlement (Caskey 1962–1972). The northern part of the island has been explored through a number of surveys that confirmed that Ayia Irini was the only large settlement in northern Kea (Figure 6.12), if not the entire island – and has been since the Early Bronze Age (Cherry, Davis and Mantzourani 1991; Georgiou and Faraklas 1985). The town's size and layout are suggestive of "some form of political organization, interregional trade, craft specialization, [and] metallurgy" (Schofield 1998: 120).

The town's architectural development has been divided into various periods (Figure 6.13). Following a period of abandonment after the end of Period III (Early Bronze Age), Ayia Irini was re-founded in Period IV (early Middle Bronze Age). Unfortunately, the settlement architecture from this Middle Bronze Age town is not well known as remains are scattered underneath the later Late Bronze Age I town; however, the fortification system with a gate protected by a horseshoe-shaped tower and the 'Temple' appear to date back to this initial phase. Three extramural cemeteries, discussed earlier, present the most extensive collection of graves known from the Middle Bronze Age (Overbeck 1989). The fortification wall was destroyed sometime during Period IV, and the town remained unfortified until Period V (late Middle Bronze Age) when it saw the enlargement of the fortifications – the 'Great Fortifications' – alongside the erection of many new buildings. It is likely that the entire peninsula was densely populated, but details are uncertain (Davis 1986). After another destruction, perhaps by an earthquake, the town was levelled and rebuilt in the early Late Bronze Age (Period VI) along a different alignment. The fortifications were also rebuilt at this time. By Late Cycladic II, previously open courtyards and spaces had been filled in.

The town that survives today dates to the Late Bronze Age and was about 1 ha in size. In addition to the fortification walls, the most important architectural structures are House A and the 'Temple'. House A is considered the central building of the settlement. While its main construction, rebuilding and occupation can be dated to Periods VI and VII, some rooms had Middle Bronze Age predecessors (Cummer and Schofield 1984: 30–34). Separated from adjacent buildings by small alleys, House A was free-standing. With 39 rooms, passages and open spaces spread out over three stories, the building was

PLATE

General plan of the Late Bronze Age town
at Ayia Irini (drawing by R. L. Holzen)

Figure 6.12 General plan of the Late Bronze Age town at Ayia Irini on Kea (Cummer and Schofield 1984: Plate 3). Image courtesy of The Department of Classics, University of Cincinnati.

Ayia Irini Period	Cycladic chronology	Select archaeological features
VIII	LC IIIA	Partial reconstruction
VII	LC II	House A; earthquake destruction of town
VI	LC I	Houses, incl. House A
V	MC III	New fortifications
IV	MC II	Reoccupation; construction of fortifications and 'Temple'
Hiatus	MC I	Temporary abandonment
	EC III	
III	EC II	
II		Buildings
Hiatus	EC I	
I	FN	

Figure 6.13 The chronological sequence of Ayia Irini on Kea.

the largest (37 x 22 m) in the settlement (Figure 6.14). The architecture and small finds indicate that the dark basement was predominantly dedicated to storage and cooking. The eastern section of the ground floor – with its large open courtyard, columned hall and extensive frescoes – was probably dedicated to public functions. The southern section is interpreted as private quarters and contained a frescoed parlour, a bathroom and toilet, and a small courtyard. The south-central section is considered the original private quarters prior to the construction of the southern quarter, containing numerous frescoes and a bathroom. In the final phase, these rooms were given over to pottery storage and metalworking. Evidence of weaving and pithos storage characterise the south-central section. The central-west section is heavily disturbed by later activity, but the presence of millstones, grinding stones and saddle querns signals its use as a working-area. The discovery of numerous marble cores hints that stoneworking may have been another household industry practiced at House A. The westernmost section is enigmatic, but the presence of a snake amphora, rhyta, offering stands and figurines make it possible that a shrine was located here. The building also stands out due to its plentiful Minoanising architectural and iconographic features that include indented façades, cut slab pavement, a light well, a drain, a pillar room, terracing and colourful frescoes (Figure 6.15) (Hitchcock 1998: 172). Given its size and complexity, the excavators considered it to have been the residence of the governing local authority (Cummer and Schofield 1984).

Considerable pottery evidence from Ayia Irini throws a revealing light on its connections with the outside world, especially Crete, the Cyclades and the Greek mainland, and shows ever-changing interaction patterns through time. Minoan imports were rare at the beginning of Period IV, but had already increased to an estimated 8% by its end (Overbeck 1982: 40). By the end of the Middle Bronze Age, they had become "abundant" (Davis 1986: 6) and continued to constitute the largest group of imports until Period VII when Mycenaean imports began to supersede Minoan ones (Cummer and Schofield 1984: 146). Alongside Minoan imports, the potters produced ever-increasing numbers of local imitations,

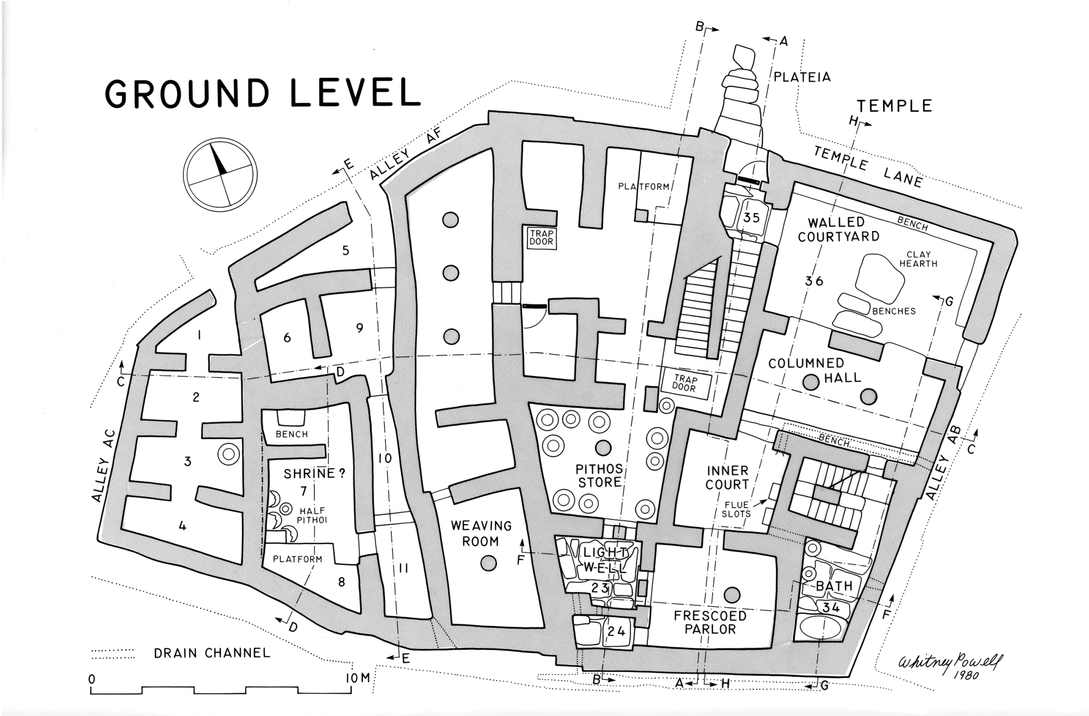


Figure 6.14 Reconstructed ground floor of House A (Cummer and Schofield 1984: Plate 25b). Image courtesy of The Department of Classics, University of Cincinnati.

including cups, jugs, jars, cooking pots and specialised vessels – many of which were wheel-thrown. The most common shape imitated is the conical cup (Figure 6.16) which has been found in thousands and constitutes up to 50% of the total pottery in some contexts (Cummer and Schofield 1984: 47–48). The inhabitants of Ayia Irini also had contacts with Melos from where they imported elegant Cycladic White vessels and coarse transport or storage vessels. Adding up to 6% in Period IV, Melian imports reached their greatest popularity in Period V. Imports continued in the Late Bronze Age but were small in numbers (Cummer and Schofield 1984). Imports from the mainland consisted of Grey Minyan serving vessels, Matt-Painted barrel jars and basins and fine Mycenaean serving vessels. While Grey Minyan and Matt-Painted were popular during the Middle Bronze Age (Overbeck 1982: 40–43), it was Mycenaean pottery that accelerated in the Late Bronze Age and had become the largest import group by Late Cycladic II (Cummer and Schofield 1984: 146).

Other small finds from the settlement show the island's great affinity with Minoan Crete: stone vases were imported from Crete and imitated locally (Caskey 1962: 273; Cummer and Schofield 1984: 140). One fragment of a baked clay tablet with one incised Linear A sign and traces of others, and other clay items with inscriptions in Linear A, as well as a number of pot marks have been found (Caskey 1962: 273, 1966: 365–367). Fifty-five Minoan-style lead weights covering Period V to VIII

Minoanising features
'Labyrinthine' circulation pattern
Non-axial layout of rooms
Some cut or ashlar masonry
Increased use of limestone
Indented facades
Irregular ground plan
Cut slab pavement
Red plaster in the interstices
Light well
Frescoes with Minoan-style motifs
Halls
U-shaped drains
Pillar room
Terracing
Courtyard
Staircase-entry arrangement
Auxiliary staircase
Hearth in courtyard

Figure 6.15 Minoanising features at House A (after Hitchcock 1998).

Figure 6.16 Locally produced conical cups from House A (Cummer and Schofield 1984: Plate 47 a–c). Images courtesy of The Department of Classics, University of Cincinnati.

(Petruso 1992) were also discovered (Figure 6.10). In addition, much obsidian, some marble and several lead, silver and bronze objects have come to light that also indicate strong contacts with Melos, other Cycladic islands and Lavrion. The nearby site of Troullos has been considered a watchtower, shrine or Minoan-style peak sanctuary (Caskey 1966: 375–376, 1971: 391–395; Sakellarakis 1996: 93).

Despite plentiful evidence of material imports and foreign influence at Ayia Irini, the inhabitants were firmly rooted in their local Cycladic culture (Caskey 1972: 391). The town's openness towards foreign features and technology in all areas of industry, craft and arts has been linked to Ayia Irini's central geographic position as an intermediary for metal exchange between the Mainland and Crete (Berg 2007a): the range and number of metals, finds of litharge, slag pieces, crucibles, tuyères and the attribution of virtually all analysed metal to the Lavrion field (Gale 1998) point to Ayia Irini as a recasting and redistribution centre for metals. Evidence of weaving, aromatics and stoneworking is spread across the settlement suggestive of part-time household-based production also in other crafts. Ayia Irini truly appeared to have been "one big 'workshop'" (Schofield 1990: 209).

PHYLAKOPI ON MELOS

The island of Melos is the westernmost of the Cyclades and lies halfway between Crete and Attica. It has been explored in some detail by both surveys and various excavations at the site of Phylakopi (Renfrew and Wagstaff 1982; Atkinson et al. 1904; Dawkins and Droop 1911; Renfrew et al. 2007a; Whitelaw 2004). Following the characteristic dispersed pattern of small farmsteads and cemeteries during the Early Bronze Age, Phylakopi emerges as the primary centre of Melos during the Middle Bronze Age. Survey work has not revealed evidence of other sites during this period or the subsequent early Late Bronze Age, and Phylakopi may indeed have been the only settlement on the island during these periods (Renfrew 1982: 35–43).

Phylakopi is a coastal town situated in the northeast of the island. Excavations have revealed several phases of occupation (Figures 6.17 and 6.2), and it appears that the town had already reached a considerable size by the end of the Early Bronze Age (Phylakopi I). The Middle Bronze Age town (Phylakopi II) was at least of equal size, even though the stratigraphy is not fully clear due to the overlying later

Date	Mackenzie's City	Renfrew's Period	Architectural and material features
LC III	III-iii	IV	Strengthening of fortification, erection of Megaron, sanctuary, imports now of Mycenaean character
LC I–II	III-i-ii	III	Large settlement with major fortification, central Mansion with administrative system, imported Minoan pottery, frescoes, 'pillar crypt', Linear A script
MC	II	II	Stone-built houses within a large settlement; pottery imports from Crete, Greek mainland and other Cycladic islands
EC III	I-ii-iii	I	Stone-built houses within a large settlement with extensive cemetery; limited contacts with the Cycladic world
EC II	I-i	0 (A2)	Scanty traces of small settlement
EC I	Pre-City	0 (A1)	Scanty traces of small settlement

Figure 6.17 Phasing of Phylakopi with key architectural and material features.

remains. Currently, no public or specialised buildings, indicative of a central authority, are known from this phase, though the street system seems to date back to the MBA. After a destruction at the end of the Middle Bronze Age, Phylakopi was rebuilt. The Late Bronze Age town (Phylakopi III) extends over ca. 2 ha. The presence of an impressive fortification wall and the Mansion, a large, special-purpose building (Figure 6.18), speak to some kind of central organisation. Frescoes, like the famous 'Flying Fish' fresco, come from the pillar crypt area and can also be assigned to this phase. The discovery of two fragments from one Linear A tablet nearby might indicate the use of some administrative system at Phylakopi, with the Mansion as the likely organisational centre (Renfrew 1982: 39).

The excavations have also provided good insights into the islanders' relationship with neighbouring islands as well as more distant regions. Melian pottery was well liked abroad. Presumably because of its unusual fine buff clay, its quirky shapes and colourful decoration, Cycladic White was frequently exported and has regularly been found on other Cycladic islands, Crete, the Greek mainland and beyond. While quite a wide range of serving vessels was manufactured in this fabric, typical Cycladic shapes like hemispherical cups and jugs predominated. Pottery made in the typical coarse brown to red fabric was less popular as an export (Berg 2000: Appendix).

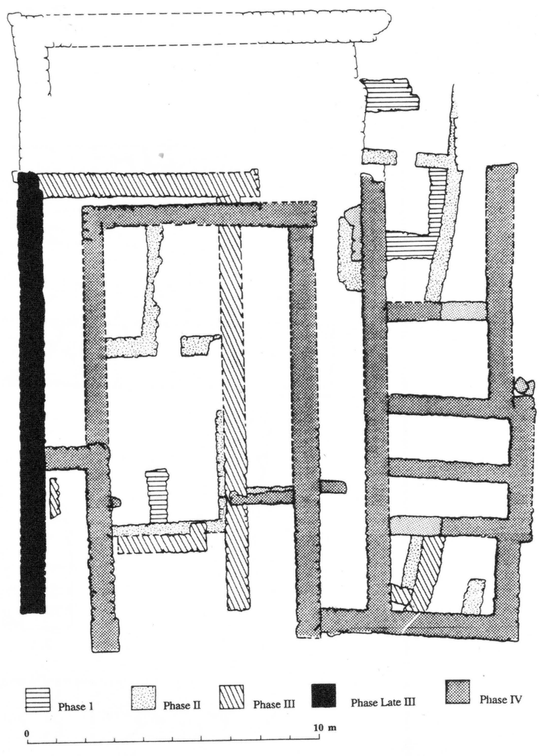


Figure 6.18 Plan of the LC I Mansion and later Megaron at Phylakopi (Renfrew et al. 2007a: Fig. 3.15). Image reproduced with permission of the British School at Athens.

The inhabitants of Phylakopi revealed a strong desire to adopt Minoan cultural objects. Minoan imports peaked in the late Middle Cycladic and decreased subsequently. Instead, ever more Minoan shapes were produced locally, eventually reaching at least 20% of the entire ceramic production in Late Cycladic I (Figure 6.19). Interestingly, when imitating Minoan shapes, the local potters did not merely copy the form, but made exact copies of the originals – including shape, forming technique, clay colour and decorative motifs (Berg 2007a, 2007b; Renfrew et al. 2007a).

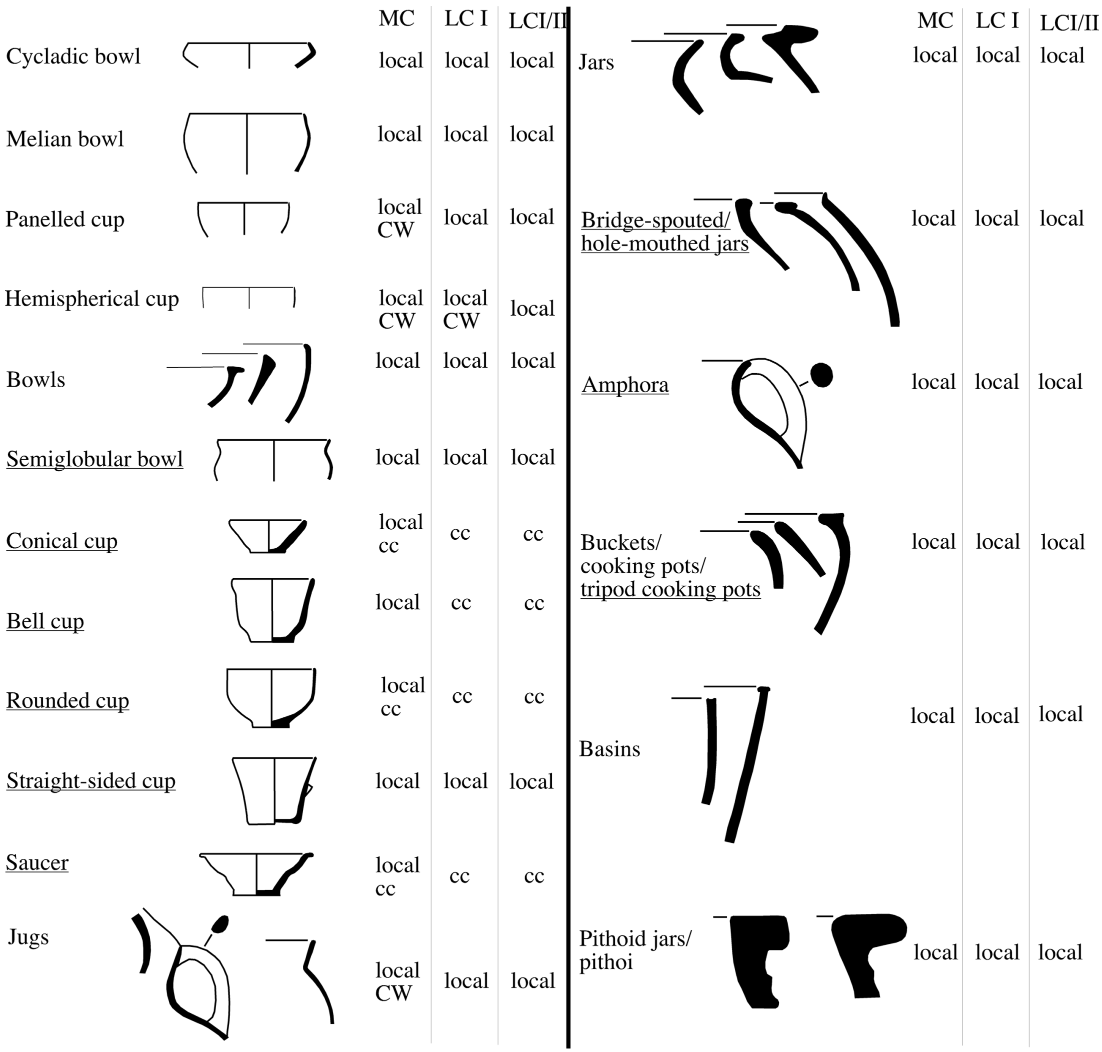


Figure 6.19 The local pottery repertoire at Phylakopi (local = local fabric; cc = conical cup fabric, CW = Cycladic White fabric).

In addition to imports from Crete, Phylakopi received pots from other Cycladic islands and the Greek mainland. Imports from the Cyclades, predominantly the central islands, were negligible in the Middle Bronze Age but increased up to the late LC I/LC II period. Imports consisted mainly of serving vessels, such as cups and bowls, jugs and jars, often imitating Minoan shapes. Grey Minyan ware was the second most popular import at Phylakopi during the Middle Bronze Age but quickly faded out. Imports were exclusively of the standard open vessels (goblets, kantharoi and bowls). Melians seemed to like the ware and copied it locally. Mycenaean wares increased drastically in popularity and became the most important import in late LC I/LC II. The most frequent shapes were cups and goblets, though a few alabastra and piriform jars have also been found (Berg 2007a; Renfrew et al. 2007a).

While the islanders inhabited a town rooted in local Cycladic tradition, they were nevertheless fully incorporated into local and regional exchange networks. Naturally, the strength and direction of contacts changed over time, but the inhabitants were always open to incorporating new ideas and designs into their ceramic repertoire.

KASTRI ON KYTHERA

The island of Kythera is the westernmost island in the Aegean Sea and serves as a convenient stopover point between western Crete and the Peloponnese. Until very recently, our knowledge of Kytheran prehistory was based exclusively on the excavations at Kastri (Coldstream and Huxley 1972). However, intensive survey work now allows us to place those original findings into a broader island-wide context (Broodbank 2004, Broodbank and Kiriatzi 2007).

The first traces of settlement date to the Final Neolithic period. During the Early Bronze Age, people lived in small hamlets scattered across the island. The only more sizeable village appears to have been Kastri. Archaeological finds from these dispersed sites show links with the Greek mainland, the Cyclades and central and western Crete and hint at diverse connections with all neighbouring regions (Broodbank 2004; Broodbank and Kiriatzi 2007). At Kastri, the earliest deposit on the Kastraki Hill (Deposit Alpha) is of Early Helladic I–II character while Deposit Beta on the Kastri promontory is of Early Minoan II character. The presence of Minoan-type pottery already in the Early Bronze Age and continuing close affinities in material culture throughout the Middle and Late Bronze Age, led the original excavators to argue for Minoan settlers who had driven out the original Helladic inhabitants (Coldstream and Huxley 1972).

Survey results now show that Cretan settlers did not expel the existing inhabitants. In fact, Cretan pottery was initially focused around the bay of Kastri, while its penetration elsewhere was minor. Broodbank (2004) therefore suggests that the Cretan and non-Cretan traditions continued alongside each other for several centuries. As regards the settlement of Kastri, however, the Early Bronze Age II assemblage does indeed show a remarkable change that supports its interpretation as a Minoan settlement: the archaeological assemblage does not merely display select Cretan traits but *is* Cretan. While made locally, pottery shapes, decoration, tempering traditions, and forming techniques all mirror those on contemporary Crete (Broodbank 2004; Broodbank and Kiriatzi 2007).

Only by the Middle Bronze Age had the Minoanising process been completed across the entire island. Most of the dispersed sites had now vanished and population became concentrated in and around Kastri. All archaeological assemblages in the remaining settlements were tightly wedded to the Minoan tradition. Ayios Georgios, a Minoan-style peak sanctuary, appears to have been established during this period. Excavations revealed over 50 bronze figurines, votive hands and legs, bronze model swords, an oxhide ingot fragment, melting debris, stone vases, offering tables and much MM I/II–LM IB pottery (Sakellarakis 1996, 2011; Sapouna-Sakellarakis et al. 2012). At Kastri, the first visible architectural remains (street, drain and house walls) are connected with a Middle Minoan IB town but the architectural evidence is scant (Coldstream and Huxley 1972: 56). MM IA to MM IIIA pottery came from rubbish deposits and was poorly represented in the settlement. MBA pottery found in graves is Cretan in character, although mostly produced locally. Brookbank interprets the lack of Cretan imports as a sign of the relative unimportance of the island in the eyes of Cretan palatial centres. Upholding Minoan traditions may have been more about Kytherans affirming their real or mythical ancestral links than Crete's interest in the islanders (2004).

During the Neopalatial period (i.e. MM III–LM IB), Kastri grew into a substantial settlement of at least 6–7 ha with several nearby 'satellite communities' (Figure 6.20). Densely distributed small, rural farmsteads infiltrated the previously empty hinterland, signalling substantial population growth either organically or through migration (Broodbank 2004). The peak sanctuary of Ayios Georgios continued

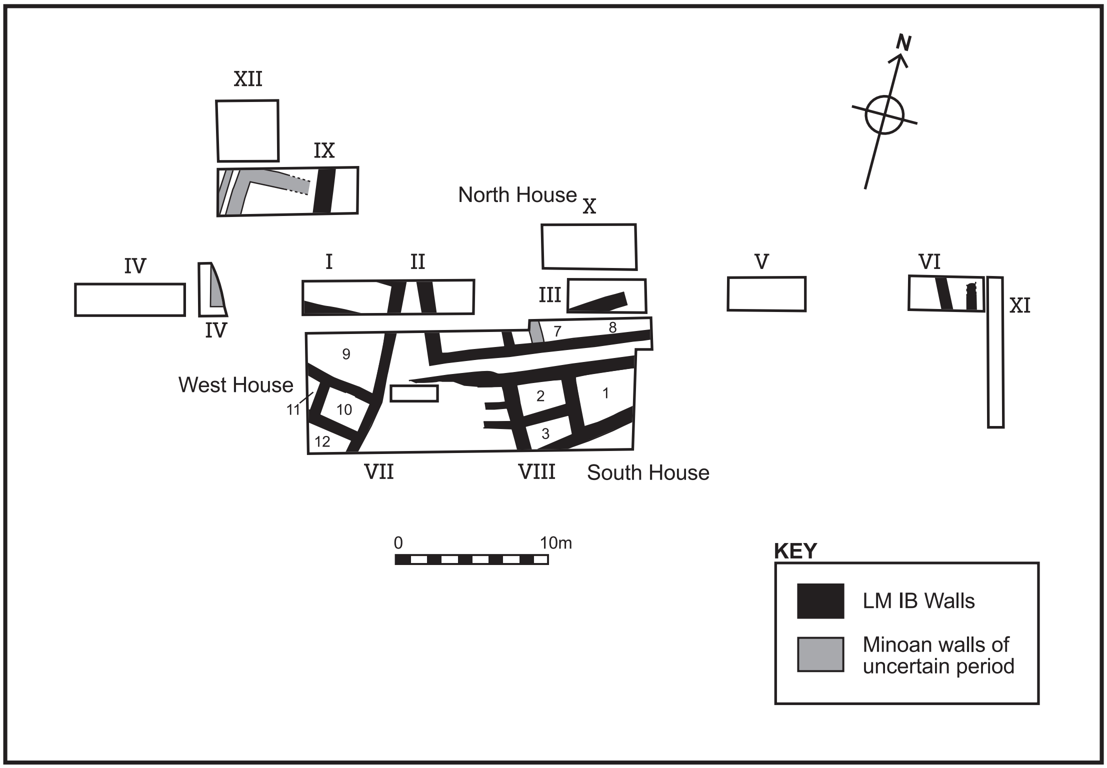


Figure 6.20 Plan of LM IB Minoan houses at Akroterion, Kastri (after Coldstream and Huxley 1972: Fig. 9).

to act as a religious focal point for the Kastri region. The material culture of Kastri still showed a strong relationship with provincial Cretan pottery sequences (Coldstream and Huxley 1972). While most of the LM IA pottery was made locally, LM IB strata showed a surge in fine Minoan imports of the Alternating Style (up to 10%) with a few sherds of LH IIA style. Strong affinities with Minoan crafts, arts and administration were ever-present. Numerous fragments of imported and imitated MM and LM I stone bowls and lamps have been discovered. The use of loomweights of Minoan styles and frescoes highlight the adoption of technological practices and artistic conventions. A prismatic seal with Cretan hieroglyphic signs, one clay weight with a Linear A sign and two other weights may hint also at the transfer of administrative practices (Coldstream and Huxley 1972). Large multi-chambered rock-cut tombs emerge for the first time. With no indigenous ancestors, their closest parallels can be found in the Knossos region on Crete; whether this occurrence – together with the intensification of deposition at Ayios Georgios and evidence of Linear A writing – hints at some kind of political alliance between Knossos and Kythera remains to be established (Broodbank 2004). Kythera was not merely a recipient of Cretan trade and traditions, but was itself embedded in exchange networks beyond Crete. Evidence for these contacts comes from its red micaceous pottery that has been found at sites in the southern Peloponnese.

Relatively unimportant for most of its prehistory, Broodbank attributes this short-lived blossoming of Kastri in the Neopalatial period in part to its central position between Crete, the Peloponnese and the central Mediterranean trade routes and in part to its own efforts in maximising its trade potential (2004). In addition, it is likely that the interruption and devastation caused by the Theran volcanic eruption in Late Minoan IA had a positive effect on Kythera's position as an intermediary between Crete and the Greek mainland.

TRIANDA ON RHODES

While surface investigations have brought to light interesting artefacts, most islands in the Dodecanese still await full exploration (Davis 1992; Davis et al. 2001; Melas 1988; Hope Simpson and Lazenby 1962, 1970, 1973). The exceptions are Rhodes, Kos and Karpathos (with neighbouring Kasos and Saros) where excavations and surveys have made great strides in illuminating the nature of Bronze Age society.

Previously considered a 'dark age', excavations have now revealed several Middle Bronze Age sites on Rhodes (Monaco 1941; Furumark 1950; Marketou 2010). The town plan of Middle Bronze Age Trianda shows houses separated by pebbled streets. House walls were built of mud, rubble and mud bricks on stone foundations; in some cases, interior walls were painted with coloured plaster. The local pottery has great affinities with the Anatolian tradition. Minoan imports first reach the island in Middle Minoan IB–II (Marketou 1998, 2009).

Following an earthquake, a large Late Bronze Age town was built over the Middle Bronze Age remains. At least four wide paved streets intersected the town and created house insulae; in total, the excavators estimate that the town extended to almost 18 ha. The wealth of this town is visible in the frequent use of monumental ashlar masonry, the incorporation of polythyra (pier-and-door partition) arrangements in every large building and the use of frescoes in almost every house. Not unlike the prosperous town of Akrotiri on Thera, the excavator considers Trianda to have acted as an important trade

emporium (Marketou 2009). Anatolian influence and local traditions were strong during the Middle Bronze Age. However, Minoan influence becomes noticeable in the Late Bronze Age in both architecture (ashlar masonry, polythyra) and small finds (Minoan imports, locally produced Minoanising pottery, imported Koan Minoanising pottery, clay and stone lamps, lead weights, naturalistic and figurative frescoes). That Minoan influence went beyond mere emulation of superficial features and extended to the adoption of ritual practices is visible in the discovery of votive bronze figurines, bull rhyta, tripod offering tables and horns of consecration (Marketou 1998, 2009). While evidence of ritual is as yet insufficient to support Benzi's proclamation of a peak sanctuary on Mt Philerimos during the Middle Bronze Age, the case looks much more convincing for the Late Bronze Age (Benzi 1984: Marketou 2009). In the Late Minoan IA period, ash fall from the Theran eruption and the earthquake that preceded it destroyed Trianda and interrupted life; the succeeding town was much smaller in size and required a flood-control system for protection. Inhabitants appear to have located to safer areas elsewhere on the island (Marketou 2009).

SERRAGLIO ON KOS

Excavations at Serraglio on Kos have brought to light evidence of a long-lived settlement (Morricone 1972/73). Continuously occupied since the Early Bronze Age, the Late Bronze Age town reached 7.5 ha in size. Rooted firmly in the Anatolian cultural tradition, inhabitants began to emulate Minoan culture from the later Middle Bronze Age onwards, resulting in a degree of hybridisation between local and Minoan traditions in the Late Bronze Age. This is evidenced by a large Minoan-style polythyron, discoid loomweights, Minoan imports and a popular local variant of Minoanising pottery, called Light-on-Dark or Dark-on-Light (LoD or DoL) (Figure 6.21), that was produced in large quantities in local

Figure 6.21 LOD jug from Kos. Image courtesy of S. Vitale.

kilns and exported to Rhodes, western Anatolia, Cyprus, Crete and the Cyclades (Marthari et al. 1990). Recent re-evaluations of the pottery assemblage stress its continuing and predominantly local character. The production of Minoanising LoD or DoL pottery is viewed not so much as a local desire to emulate superior Minoan culture, but an economic strategy to enhance maritime trade (Vitale and Hancock Vitale 2010).

KARPATHOS, KASOS AND SAROS

Unlike geographically distant Rhodes and Kos, Karpathos, Kasos and Saros are the first stopover points when travelling eastwards from Crete. Surface surveys and, more recently, excavations have confirmed 25 sites that were occupied during the Middle and Late Bronze Age (Figure 6.22). Aside from four sites that continued from the Early Bronze Age, 21 appear to have been new foundations on virgin soil with definite or probable Minoan finds. Most are probably isolated farmsteads and small settlements; the only larger site appears to have been Pigadia which may have acted as a central settlement and port town. The existence of Minoan-style chamber tombs, ashlar masonry, loomweights, stone vases, locally produced Minoanising pottery and Minoan ceramic imports highlight the islands' close relationship with Crete. First contacts with Crete date to the early Middle Bronze Age and peak in the Middle Minoan III/Late Minoan IA period (Melas 1985). Melas originally believed that Minoan Crete exerted considerable social influence upon the island and that, where new foundations can be demonstrated, Minoans probably moved to the islands and settled there alongside the local population. Following recent excavations which revealed that building techniques and house designs are local while material culture is heavily Minoanised, Melas now considers colonisation unlikely and instead argues for an adoption of Minoan material culture and technologies by local inhabitants (1985, 2009).

THE NORTHERN AEGEAN: SAMOTHRACE AND LEMNOS

Until recently, the northern Aegean islands appeared to form a relatively self-contained cultural unit that shared many traits with the Anatolian tradition. Contact with the southern Aegean seemed insignificant and weak. However, excavations on Lemnos and Samothrace, in particular (as well as at Miletus at the Anatolian coast and Imbros island), are gradually modifying our understanding. Evidence now hints at considerable Minoan influence in the northern Aegean, most likely a consequence of securing access to essential metallurgical raw materials (MacDonald et al. 2009; Davis 1992; Davis et al. 2001; Girella and Pavuk 2016).

Mikro Vouni is a settlement located on the southwest shore of Samothrace. Excavations from the 1980s onwards have revealed layers contemporary with Middle Minoan II/III that contained a number of objects linked to Minoan administrative functions (Matsas 1991, 1995; Matsas cited in Boulotis 2009: 177): two roundels, two noduli, one nodule, a mudbrick fragment with a Linear A(?) sign, a lead

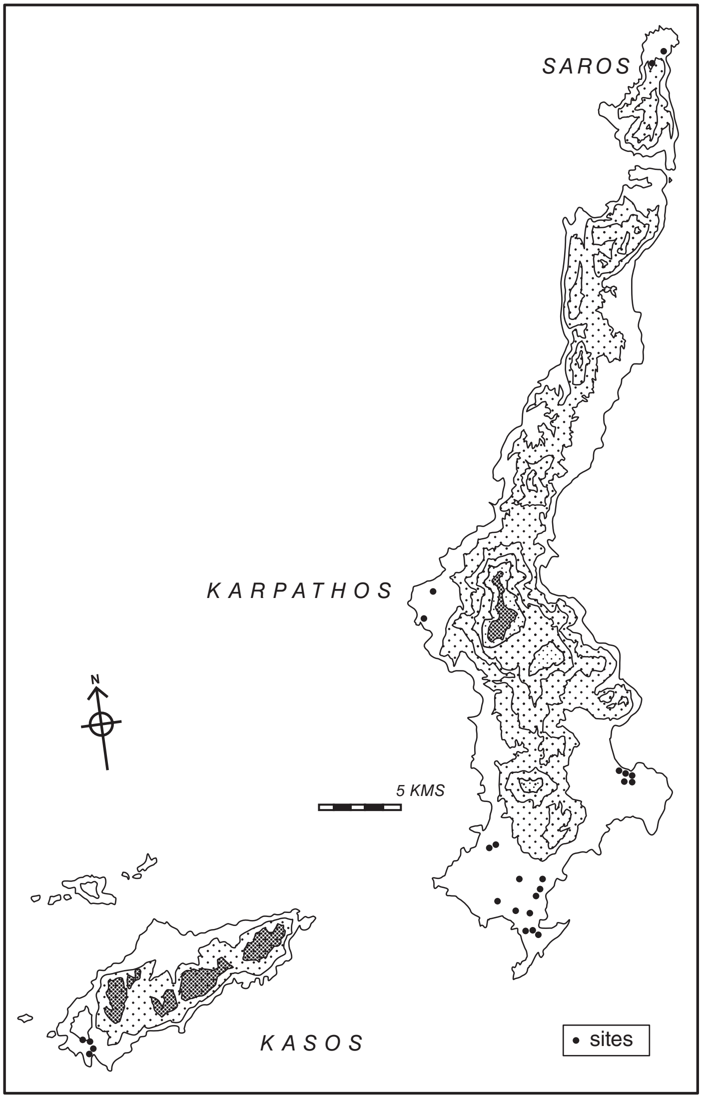


Figure 6.22 Distribution of certain MM and LM I sites on Karpathos, Saros and Kasos (after Melas 1985: Fig. 5).

balance weight, a clay nodule inscribed in Linear A(?), a clay sealing, a Minoan steatite seal and a clay seal with probable Cretan hieroglyphic signs (Figure 6.23). Associated finds include a serpentine bowl, several Minoan-style discoid loomweights, eggshell ware and painted plaster. The potential association of Minoan commercial interest with metallurgical activities in Samothrace itself or, perhaps more likely, in the north Aegean mainland is attested by the presence of a mould for making metal blades and crucibles (Boulotis 2009: 177).

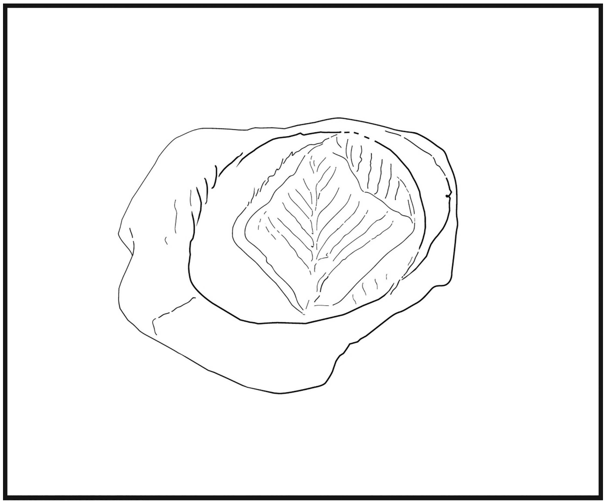


Figure 6.23 Minoan-type nodule from Mikro Vouni on Samothrace (after Matsas 1991: Fig. 8).

Following the decline of Poliochni on Lemnos after the Early Bronze Age, Koukonisi emerges as the most important Middle and Late Bronze Age settlement on the island. Approximately 500 x 400 m in size, the settlement was strategically located on a peninsula near a fertile agricultural plain and with safe twin harbour facilities. The Middle Bronze Age settlement (Koukonisi IV) is not yet fully understood, but was clearly a thriving habour site which was divided into areas by a set of primary and secondary streets. Firmly embedded in the regional tradition, the pottery shows continuity from the Early Bronze Age and resembles ceramic assemblages at Samothrace, Troy and other Anatolian sites. However, evidence of imported Matt-Painted vases from the Greek mainland, and Aegina as well as Dark-on-Light Cretan wares alludes to incipient contacts with distant regions (Boulotis 2009).

After an earthquake towards the end of Koukonisi IV, the town was quickly rebuilt. Koukonisi III is roughly contemporary with Middle Minoan III – Late Minoan I (Figure 6.24). Although firmly rooted in the local tradition, this phase is characterised by a visible increase in Minoan influence, both through imports and the adoption of Minoan-style technologies and artefact shapes. Among these innovations are Minoan-style loomweights, the use of the tubular drill for producing stone vases, straight cylindrical tuyères and Minoanising pottery shapes (some produced locally, some possibly made in the Cyclades and Dodecanese) (Figure 6.25). In terms of high quality elite objects, likely Cretan imports include a fragment from an obsidian vase, a serpentine lid, a cornelian bead, an ivory plaque, a mace-head and a green *Lapis Lacedaemonius* axe. Intensive metalworking activity, for which there is evidence, quite possibly provides the reason for interaction between Minoan traders and the islanders, either through direct procurement or as a stepping-stone island (Boulotis 2009). Thus, the island's location provided an ideal meeting point for ships travelling between the northern

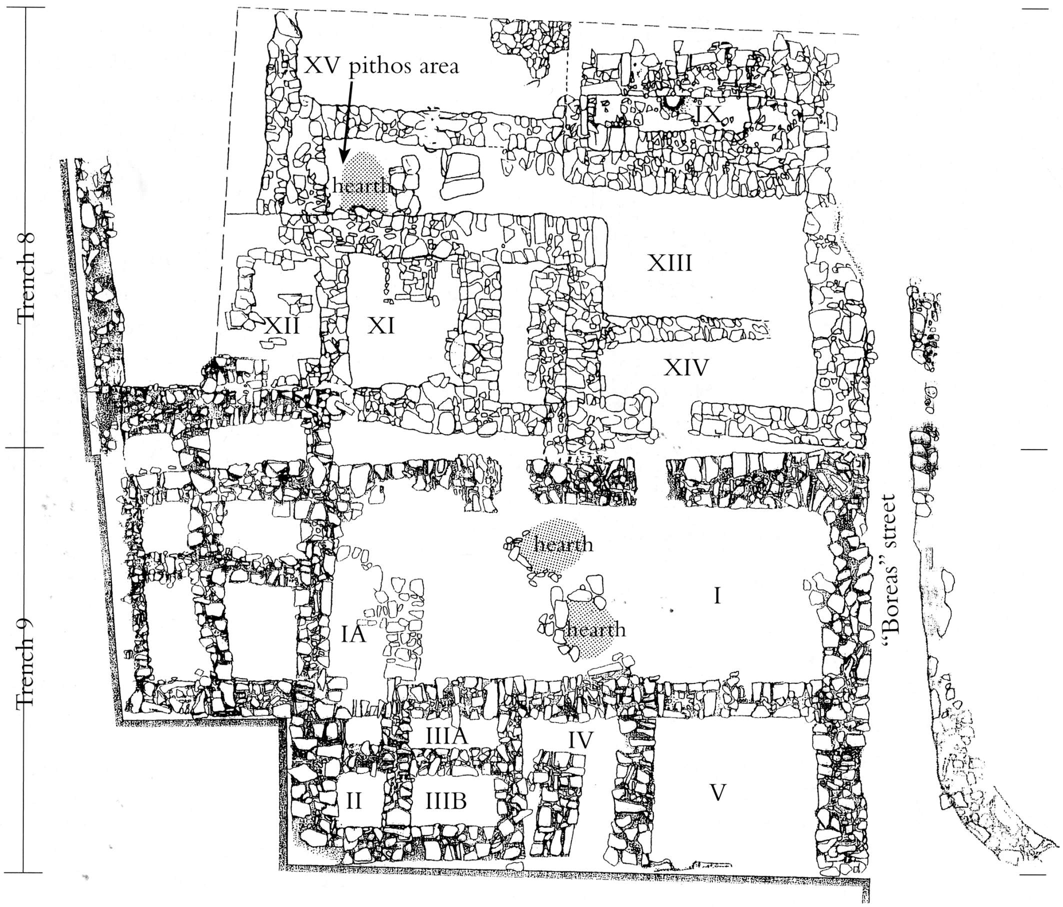


Figure 6.24 Plan of the Minoanising sector of Koukonisi III (Trenches 8 and 9) (Boulotis 2009: Fig. 5). With permission of The Danish Institute at Athens.

Aegean, Macedonia, Thrace, Troy and the southern Aegean. These connections manifest themselves in the diverse material culture that shows contacts with neighbouring islands, the Troad, mainland Greece (south and north), the Cyclades and Crete.

CONTEXTUALISATION: MINOANISATION

Prehistoric settlements on many Aegean Islands (as well as the Greek mainland and the Anatolian coast) show a dramatic increase in the number of Cretan imports, local imitations and the adoption of Cretan architectural, technological, culinary, artistic, administrative and ritual features and practices between the Middle and early Late Bronze Age period. This escalating presence of Minoan features has been

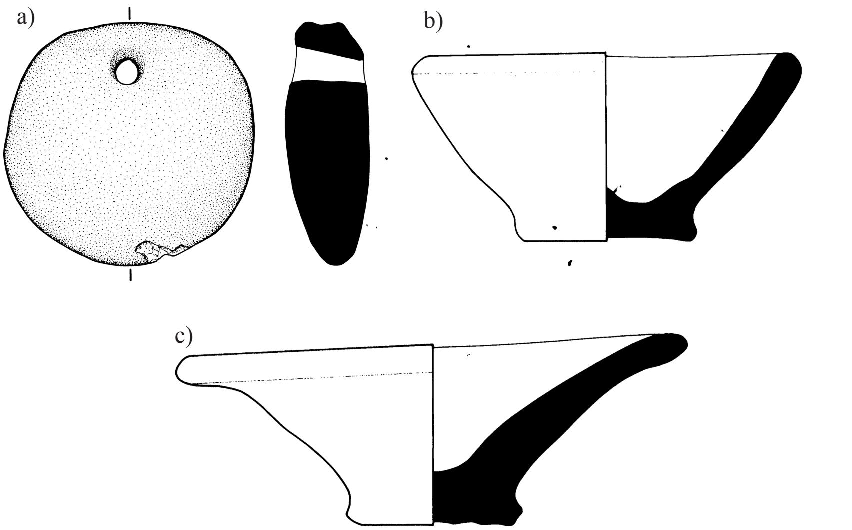


Figure 6.25 Minoanising artefacts at Koukonisi III: loomweight, conical cup and saucer (Boulotis 2009: Figs. 9 and 22). With permission of The Danish Institute at Athens.

called 'Minoanisation'. Scholars have put forward many models and approaches to explain the phenomenon and elucidate common trends.

At the very heart of this debate stand two ancient literary sources that, at first glance, appear to provide a convincing explanation for the phenomenon, namely the existence of a Minoan sea empire.

> [F]or Polycrates was the first Greek, of whom I have knowledge, to aim at the mastery of the sea, leaving out of account Minos of Cnossus and any others who before him held maritime dominion.
>
> (Herodotus III.122,2)

> Minos is the earliest of all those known to us by tradition who acquired a navy. He made himself master of a very great part of what is now called the Hellenic Sea, and became Lord of the Cyclades islands and first coloniser of most of them, driving out the Carians and establishing his own sons in them as governors. Piracy, too, he naturally tried to clear from the sea, as far as he could, desiring that his revenues should come to him more readily.
>
> (Thucydides I.4)

Although Thucydides and Herodotus composed these texts in the 5th century BC, more than 1,000 years later than the height of the Minoan civilisation, the image of a powerful sea empire ('thalassocracy') with island colonies under the rule of the Cretan King Minos proved very attractive to scholars and became a common trope in scholarship. Arthur Evans, the excavator of Knossos, started referring to these texts as an explanation for his finds, and firmly embedded the notion of a thalassocracy into his

portrayal of Minoan society (1928: 192–198). This interpretation was quickly adopted by others, and scholars began to consider the finds newly emerging from the Aegean islands as evidence of an "oversea outpost of the Minoan culture" (Hall 1905: 83, in reference to excavations at Phylakopi on Melos).

During the 1960s and 1970s new data from excavations across the Aegean helped 'flesh out' the details of the Minoan colonies: in addition to the abundant pottery evidence, scholars realised that architectural and technological features also displayed Minoan influence. The recognition of Minoan religious features outside Crete, such as peak sanctuaries and religious items or symbols, added a new dimension to the 'Minoan thalassocracy'. Of great importance was the discovery of Linear A inscriptions and tablets, indicating that the Minoan record-keeping system was in use outside Crete. However, the increasing amount of data not only highlighted the great diversity in Minoan influence at the different postulated colonies, but also forced scholars to reconsider the islands' relations with the Greek mainland, Kythera and Aegina. As a result, it was no longer viable to apply a uniform 'thalassocracy' interpretation to all situations.

Despite broad acceptance of the dogma, there were also dissenting voices that attempted to draw the attention of scholars to the historic contexts within which Thucydides and Herodotus had been composing their texts. Starr (1954/55), for example, demonstrates that the myth of King Minos was drawn on by writers when nations or city states were exercising rule of the sea or aspiring to do so. Merely a powerful man in Homer (*Od*. XI 322, XIX 178; *Il*. XIII 450), King Minos first becomes associated with maritime dominion in Herodotus' writings at a time when Athens exercised 'thalassocracy' over the Aegean. Later, Thucydides alludes to the myth in the context of Athens attempting to establish herself as a sea power against the Delian league. References to King Minos were thus used to legitimise Athens' bid for power and did not present an accurate account of past times (Baurain 1991). When the myth re-emerges again in the 19th century in the writings of Arthur Evans, the climate is again saturated with imperialist notions, this time in relation to a British sea empire. Having waxed and waned in parallel with historic sea empires, the 'Minoan thalassocracy' trope is best regarded as the expression of a political climate in which sea empires were existent or aspired to rather than an accurate portrayal of past events (Fears 1978: 116).

The diversity of the finds emerging from island excavations from the 1960s onwards made it clear that each site had interacted with Minoan culture in different ways and at different intensity. This recognition eventually began to undermine the notion of a single, all-encompassing explanation, such as the 'thalassocracy'. Instead, a search for new, more adequate models and explanations began, and a number of conferences and ground-breaking articles acted as the springboard for many of the ideas (Branigan 1981; Davis 1979; Cherry and Davis 1982; Doumas 1978; Hägg and Marinatos 1984).

The most influential contributions were made by Davis and Cherry (Davis 1979; Cherry and Davis 1982), Branigan (1981, 1984) and Wiener (1984).

Davis and Cherry's 'Western String'

The concept of the 'Western String' was first proposed by Davis in 1979. Davis was trying to explain the great numbers of Minoan imports and Minoanising items at the sites of Ayia Irini, Phylakopi and

Akrotiri, but comparative lack of Minoan influence on all other Cycladic islands. Assuming that the greater intensity of Minoanisation at these sites accurately reflects the intensity of trading contacts with Minoan Crete, he believed that the 'Western String' settlements (i.e. Akrotiri, Phylakopi and Ayia Irini) represented preferential stopover ports for Minoan traders travelling from Crete to the Lavrion metal mines in Attica. In exchange for Minoan objects, the islanders could have traded silver, lead, saffron, unguents, wool and stone. These three islands might, in turn, have served as redistributive centres of Minoan goods to neighbouring Cycladic islands (Davis 1979). While the model considered Ayia Irini, Phylakopi and Akrotiri to have been the most important trading nodes, Cherry and Davis did acknowledge the possibility of alternative trading routes (1982).

The 'Western String' soon became widely accepted (Graziadio 1998: 37; Mountjoy and Ponting 2000; Rehak and Younger 1998: 136) and was soon joined by another preferential trading route, the 'Eastern String' (from Crete via Karpathos to the Dodecanese and Carian coast) (Davis et al. 1983; Niemeier 1984).

Since the 1970s, new excavations and surveys have, however, undermined the proposed special relationship of the 'Western String' islands with Minoan Crete. New Minoanising finds from Mikre Vigla on Naxos and from Skarkos on Ios, for example, show that similarly intense, but diverse, interaction with Crete is evidenced at these sites also (Barber and Hadjianastasiou 1989; Marthari 2008: 82).

Branigan's colony classification

Drawing on ethnographic parallels, Branigan (1981, 1984) distinguished three types of colonies according to the quantity and quality of artefact groups: 'settlement colony', 'governed colony' and 'community colony'. A 'settlement colony' refers to a new foundation by foreign people on virgin soil. The term 'governed colony' denotes "existing settlements which have a foreign administration or government imposed upon them by force" (Branigan 1981: 25). The third category, 'community colony' or 'enclave colony', implies that a number of foreign people settled in a distinct, spatially demarcated area within an existing town.

Branigan (1981, 1984) considered Kastri on Kythera to be a plausible candidate for a Minoan 'settlement colony', because the settlement was considered to have been a new foundation in EM II, and the existence of a drainage system, Minoan ceramic shapes and decoration, Minoan stone vases, Linear A and Minoan burials indicated that Cretan people had migrated here. Phylakopi, Ayia Irini and Akrotiri, on the other hand, could not have been settlement colonies, since all three had been thriving Cycladic settlements. Minoan-type frescoes, weights, symbolic items, Linear A, pottery and architectural features have been discovered at all three sites, but were frequently adapted to local traditions. As there are also no signs of warfare that may indicate a forceful take-over by a foreign power, Branigan considered Phylakopi, Ayia Irini and Akrotiri to have been 'community colonies'.

Branigan's colony classification is, however, not without problems as it advocated a direct relationship between the type and frequency of material evidence and the strength of Minoan political or economic influence. As ample anthropological and archaeological case studies testify, this direct relationship between material and socio-political organisation is by no means a constant, and contrasting examples are easily found. The best-known example comes from 2nd millennium Kültepe in Anatolia where foreigners and locals cannot be distinguished through their use of material culture. Literary evidence makes

it clear that a group of foreign Assyrian merchants lived in an enclave, a ‘karum’, outside the walls of Kültepe. As they used local building materials, adopted the local material culture and took local wives, their assimilation was so complete that archaeologists would have been unable to discover their presence had it not been for the archived tablets which gave account of exchange and interaction between the trade community and the Assyrian homeland (Emre 1963; Özgüç 1964). The reverse situation, namely that plentiful interaction can exist between foreigners and locals without either of them adopting features from the other, has been observed by Hodder (1978a, 1978b) who concludes that no predictive relationship exists between the degree of interaction and the intensity of cultural similarities (Hodder 1982: 8). Despite the methodological issues raised, Branigan’s colony scheme can still act as a useful heuristic device, even if it cannot provide an explanation of the phenomenon.

Wiener’s ‘Versailles effect’

Instead of equating material evidence and the degree of cultural influence in a linear fashion, Wiener (1984) put forward a process-oriented model which examined the reasons behind the adoption of new/foreign features as part of the debate about Minoanisation. His model of emulation processes, called the ‘Versailles effect’, interpreted the presence of Minoan artefacts and imitations as a consequence of their social desirability. Wiener’s ‘Versailles effect’ refers to the widespread adoption and imitation of ‘fashions’ emerging from the court of Versailles in 17th–18th-century Europe (Wiener 1984: 17). The model stipulates that no political or economic gain is necessarily implied, but that cultures strive to imitate a society because they perceive it to be culturally superior; and the reasons for imitating foreign material culture and social behaviour lie within the receiving society (e.g. social stratification).

The ‘Versailles effect’ also has methodological flaws as it perceives Minoanisation as a homogenous and self-explanatory process. As a consequence, it cannot explain the observed cultural diversity and varying degrees of Minoan influence between settlements. Nevertheless, its appeal remains strong and most discussions of Minoanisation will implicitly or explicitly draw attention to the desirability of Minoan material culture.

Recent critiques and approaches

Since the 1980s, our understanding of ‘Minoanisation’ has become more nuanced thanks to the realisation that each island site engaged to varying degrees and at varying intensity with Minoan objects, technologies and beliefs. Akrotiri is, for example, commonly recognised as heavily Minoanised while the northeastern Aegean islands show no evidence of Cretan-inspired architectural styles, frescoes, funerary customs, rituals or religious symbols (Figure 6.26). Thus, approaches that subsume all island settlements under the same heading, such as the ‘Western String’, ‘Versailles effect’ or ‘colonies’ prevent us from appreciating the diversity of the archaeological record. There now seems to be a scholarly consensus that it is only through detailed contextual analysis of each settlement and its finds that we can

Site	General pattern	Architecture	Pottery styles	Pottery manufacturing techniques	Weaving technology	Frescoes	Administration	Ritual/ religion
Cyclades								
Phylakopi, Melos	Local tradition with Minoanising features	*	*	*	*	*	*	-
Ayia Irini, Kea	Local tradition with Minoanising features	*	*	*	*	*	*	*
Akrotiri, Thera	Local tradition with Minoanising features	*	*	*	*	*	*	*
Kastri, Kythera	Strong Minoan influence, possible presence of Minoans	*	*	*	*	-	*	*
Dodecanese								
Trianda, Rhodes	Local tradition with Minoanising features	*	*	*	*	*	-	*
Serraglio, Kos	Local tradition isolated Minoanising features	*	*	-	*	-	-	-
Southwestern Anatolia								
Miletus	Strong Minoan influence, possible presence of Minoans	*	*	*	*	*	*	*
Iasos	Local tradition with Minoanising features	*	*	*	*	-	-	-

Figure 6.26 Minoanising features in the Aegean islands during the LB IA period (after Vitale 2016: table 5.4).

explore the socio-political or economic considerations at play which made individual sites more or less receptive to absorbing or emulating Minoan features (Berg 2007a; Knappett and Nikolakopoulou 2008).

Drawing on post-colonial approaches, several contributions to a recent workshop on Minoanisation (Gorogianni, Pavuk and Girella 2016) have attempted to systematise our analysis by distinguishing three stages of Minoanisation: pre-contact, contact and a hybrid stage. Pre-contact denotes the stage prior to the first direct or indirect contact with Minoan objects or practices. The contact stage is characterised by the first appearance of Minoan imports – most commonly pottery and loomweights – and often followed by the production of truthful local copies. Finally, during the hybrid stage Cretan ideas

and types are modified, reconfigured and changed, forming a hybrid local repertoire that brings together Cretan and local features in new and innovative ways, such as the popular Koan DoL/LoD pottery styles. While without explanatory power, this model is nevertheless very helpful as a structuration device to help understand the timing, progression and depth of the acculturation processes at play at individual sites (Figure 6.27).

However, we need to guard against potential pitfalls. Past approaches, for instance, had a tendency to regard Minoans as the active cultural envoys and the islanders as passive recipients. Instead, the archaeological evidence clearly indicates that islanders played an active role in determining the degree of Minoanisation. For example, the adoption of Minoan features at Phylakopi was obstructed by cultural values that had become associated with traditional pottery manufacture. In contrast, Ayia Irini's receptiveness to Minoan features indicates a deliberate strategy to attract trade (Berg 2007a). Finally, we must not forget that all islands had wide-ranging connections with places and regions other than Crete. Contact with immediate neighbours, towns on the Greek mainland and locations further afield are visible in the archaeological record. These relationships waxed and waned, and different network links gained prominence at different points in time. Thus, however noteworthy Cretan cultural influence appears to have been, we have to bear in mind that it represents only one phase in a settlement's fluctuating, multi-nodal web of contacts.

Variation is also visible in who the drivers of change were. Whitelaw (2005) and Gorogianni (2016: 145), for example, have argued that imitation of Cretan-style architectural features at Phylakopi and Ayia Irini respectively was a deliberate strategy employed by the local elites in order to maintain or enhance their standing locally or at a regional level. This contrasts with the adoption of popular Minoan ceramic shapes and decorative repertoires which reflect general fashion trends that drew on popular Minoan prototypes rather than deliberate political strategies. Whatever the precise local situation, there is little doubt that Aegean island communities emulated Cretan-style fashions, technology and cultural practices to express their participation in an Aegean-wide power vocabulary (Davis and Gorogianni 2008).

Minoan feature	**Period**		
	IV (= contact phase)	**V**	**VI (= hybrid phase)**
Pottery imports	*		
Minoanising vessel shapes	*		
Minoanising decoration		*	
Minoan manufacturing technology	*		
Cooking technology	*		
Textile production	*		
Administration		*	
Frescoes			*
Architecture			*
Ritual/religious practices			*

Figure 6.27 First appearance of Minoan features at Ayia Irini, Kea (after Gorogianni 2016: Table 8.4).

A nuanced investigation is also essential when trying to understand Cretan evidence. Here, too, scholars tend to discuss Crete as if it were a homogenous, unified political entity when, in fact, the island's communities are diverse and heterogeneous (Broodbank 2004; Hamilakis 2002). Rather than nebulous Minoan traders or palace envoys, it was specific Cretan towns, regions or elite groups that engaged in trade with distant places – such as the proposed connection between Mochlos and Phylakopi (Carter 2004), east Crete and the Dodecanese (Marketou 1998), and Knossos/Mesara and Miletus (Knappett and Nikolakopoulou 2005). Unfortunately, due to similarities in geology across parts of the island, we are not yet able to distinguish ceramic products and influences reliably between different Cretan regions and are thus unable to illuminate the minutiae of these relationships.

Finally, let us return to the original starting point of our discussion, namely the notion of a Minoan thalassocracy ('rule over the sea'). The existence of Minoan political control over the Aegean islands or regions appears to be distinctly anachronistic in light of increasingly strong evidence of regionalism and fractional identities on Crete. Meta-analyses of field survey data have provided evidence of fluctuating power bases on Crete which, while favouring Knossos in the Neopalatial period, were neither dominant nor permanent (Cunningham and Driessen 2004; Driessen 2001). Whether any kind of consistent, formal control over other regions could have been established under those circumstances is doubtful, and indeed the nature and paucity of Cycladic sealing evidence speaks against such claims (Karnava 2008). Instead, scholars have drawn attention to the possibility of more ephemeral, informal control mechanisms, such as inter-marriage between elites and seaborne raids (Broodbank 2004), not to mention economic or cultural means of influence.

7

AKROTIRI ON THERA

The settlement of Akrotiri on Thera is one of the most iconic places in the Aegean Bronze Age. Destroyed by a large volcanic eruption in Late Cycladic I, its preservation of architectural remains and objects is unique, and it has therefore rightly been called the 'Pompeii of the Aegean'. This chapter will provide a summary of the history of the settlement through time, especially the Middle and Late Bronze Age. The details of the eruption itself, its extent, sequence, dating and environmental impact on neighbouring regions are explored in Chapter 8.

HISTORY OF DISCOVERY AND EXCAVATION

The ancient settlement of Akrotiri is located close to the sea and the foot of a mountainous elevation in the southern part of the island of Thera, which in turn was the southernmost of the Cycladic islands and the final stopover location for journeys to Crete ca. 90 km to the south (Figure 7.1). The settlement, following its foundation in the Neolithic period, had steadily grown in size until it was buried in its entirety by a large volcanic eruption in the Late Minoan IA/Late Cycladic I period (Figure 7.2). Details of the volcanic history of the island, the eruption sequence that covered the settlement and the debate around the dating of the eruption are discussed in Chapter 8. Only a section of the settlement has been excavated to date and the majority still lies under volcanic ash awaiting discovery (Figure 7.3). It is uncertain whether this section is characteristic of the entire settlement or represents an unusually wealthy quarter within the city. A single or double harbour was probably located not far south of the town (Doumas 1983: 55; Palyvou 2005: 23) and fertile agricultural land was within easy reach.

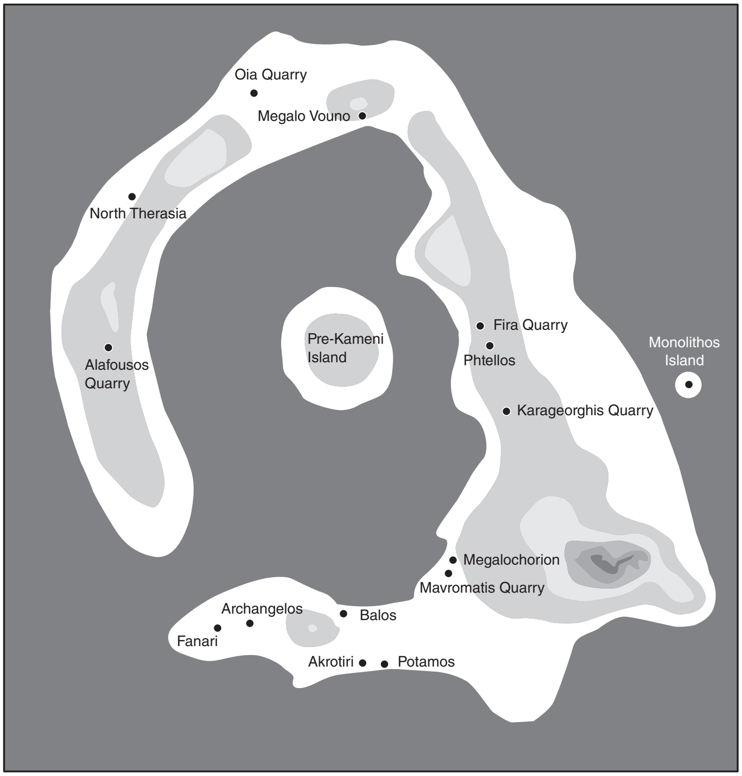


Figure 7.1 Key sites on Thera (after Friedrich 2000: Fig. 10.13).

Crete	Akrotiri, Thera
LM IA Mature	Volcanic Destruction Layer (VDL)
LM IA Early	Seismic Destruction Layer (SDL)
MM III	Phase D: large urban centre
MM IIB–IIIA	Phase C: large urban centre
MM II	Phase B: town
MM IB	Phase A: town
MM IA	
EM III	Flourishing settlement
EM II	
EM I	
Final Neolithic	
Late Neolithic	First habitation of site

Figure 7.2 Chronology of Akrotiri, Thera.

Figure 7.3 Town plan of Akrotiri on Thera. Image courtesy of the Akrotiri Excavation Archive.

Drawing on limited clues provided by earlier investigators and locals who reported the recovery of ancient finds from the Potamos valley and the area of Favatas, prominent Greek archaeologist Spyridon Marinatos decided to focus his excavations on this particular site to find proof of whether the eruption of the Theran volcano had caused the demise of the Minoan civilisation (Doumas 1983: 11–12). Following a survey, excavations began in earnest in 1967 and quickly brought to light the truly amazing finds. The main focus of the excavations was understandably on the Late Cycladic I period when the entire site was destroyed (and therefore also preserved) by a volcanic eruption. However, valuable information about earlier phases was uncovered in the 1990s and 2000s when 100 shafts for new roof supports were sunk deep into the ground. Following Marinatos' death in 1974, excavations have continued until present day under the directorship of Christos Doumas.

The existence of a shelter over the site from in the 1960s has ensured that the buildings and their contents have remained largely protected from the elements. Thanks to the volcanic ash covering and recent preservation efforts, the site has become known as the 'Pompeii of the ancient Aegean'. The site has been subject to a programme of systematic excavations by Marinatos and Doumas, which has included a wide range of specialists, including zooarchaeologists, palaeo-ethnobotanists, metallurgists, chemists, geologists, volcanologists, as well as finds specialists and conservators. The existence of on-site laboratories and storage facilities permits the conservation (and where possible also restoration) of finds, such as pottery, metal and organic materials (Doumas 2013). Research into all aspects of the settlement's life and the island in general has been published, including a number of important conference proceedings (Doumas 1978–1980, 1992b; Hardy et al. 1990; Sherratt 2000a).

The excavations experienced a major set-back when the new bioclimatic roof that had been built collapsed in September 2005. Following the removal of the collapsed roof, a new roof was constructed. The site re-opened for visitors in 2012 (Doumas 2013).

NEOLITHIC

Pottery fragments, stone implements and one clay figurine uncovered from deep soundings made throughout the excavation area indicate that habitation of the site began in the Late Neolithic period (Sotirakopoulou 1999, 2008). Although all evidence comes from mixed deposits, pottery fragments show close affinities with the dark-burnished ware with white-painted rectilinear designs from Saliagos off Antiparos, Grotta and Zas Cave on Naxos and Ftelia on Mykonos, and are thus dated to the Saliagos phase. About 90% of sherds come from the area of Xeste 3; the remainder from Pillar Shafts 45, 61 (near Xeste 4), and 35 (north of Xeste 2). The distribution of finds indicates that the extent of the Late Neolithic settlement was concentrated in the southern part of the current excavation. Most of the pottery fragments belong to open vases, such as bowls and cups, although closed vessels also existed (Sotirakopoulou 2008: 122–123).

Final Neolithic pottery in the form of 'cheese-pots' is now also evidenced at Akrotiri. Sherds were found scattered in the southern and eastern part of the site and indicate that the settlement had expanded somewhat in this period (Sotirakopoulou 2008: 123–124).

EARLY BRONZE AGE

Six settlement and cemetery sites are known on Thera from this period: Phira Quarries, Phtellos, Ayios Ioannis Eleimon, Archangelos, Kalamia and Akrotiri. The Early Bronze Age of Akrotiri is well known from considerable amounts of pottery, clay figurines, as well as evidence of pithoid infant burials and rock-cut chambers. Taken together, the evidence suggests continuous occupation of the site throughout the Early Bronze Age. Akrotiri appears to have been a sizeable and important Early Cycladic settlement with local craftspeople (e.g. metal workers, figurine makers) and wide-ranging connections with the outside world as attested by pottery imports from other Cycladic islands (Vaughan 1990).

The Early Cycladic I period is characterised by red-slipped or burnished conical-necked jars and burnished rolled-rim bowls with or without the typical horizontal tubular lugs. Originally the excavators believed that the Early Cycladic I settlement was limited to the area around Xeste 3 (Sotirakopoulou 1999: 228). However, recent excavations have also uncovered sherds in the eastern section (from Xeste 4 to the House of the Ladies), hinting at a much greater extent of this settlement (Sotirakopoulou 2008: 124).

Early Cycladic II and III pottery consists predominantly of coarse domestic types for storage and cooking. The main types are "pithoid jars, cooking pots, pans/hearths and basins" (Sotirakopoulou 2008: 124). Bowls, cups, jugs and sauceboats are used for serving and were made in a fine or medium coarse fabric. Comparatively rare are pyxides, askoi and miniature vases. The pottery repertoire mirrors that from other Cycladic sites. A wide range of surface treatments (e.g. Urfirnis; whitish-yellow slipped; orange slipped; grey; painted) attests to large quantities of imports. Types represented are sauceboats, one-handled pedestal cups, one-handled tankards, *depas amphikypella*, deep bowls, pans, pithoid jars and fragments of the mysterious 'mask' vases (Sotirakopoulou 2008: 125–128).

In total, 60 figurines are known from Akrotiri and were found scattered across the entire site. Most of the figurines are of the schematic type. Only 12 are naturalistic examples. The figurines were made of stone (marble, tuff, schist, black stone), clay and bone. Almost half (28) of the figurines are dated to the Early Cycladic I period and demonstrate the importance of the site already in this early period. There are eight transitional Early Cycladic I–II figurines, while six belong to the Early Cycladic II period. Sixteen belong to the Early Cycladic III period (Sotirakopoulou 2008: 128–129).

Eight Early Cycladic infant jar burials have been found at Akrotiri. Buried in pithoid jars, the vessels contained between one and three skeletons. Practices varied considerably: jars were found standing upright, sunk partially into pits, held in place by stones or relocated into rock-cut chambers sometime after their primary burial (Sotirakopoulou 2008: 130–131).

At least 25 rock-cut chambers have been located at Akrotiri, even though inhumation in cist tombs was the dominant burial form elsewhere in the Cyclades. Each structure consists of up to three subterranean chambers; they can be entered through a vertical shaft or doorway. Based on parallels from elsewhere in Greece, these rock-cut structures were probably in use during Early Cycladic II and III. Abandoned at the end of the Early Bronze Age, the chambers were utilised as rubbish dumps for domestic pots, stone vases, animal bones, shells, obsidian objects and earth at different points during the Middle and Late Cycladic period. From time to time they also served as locations for pithos burials for

children placed beneath or within the debris (Sotirakopoulou 2008: 131–133). Two contrasting uses have been proposed for the chambers. Doumas (2008) considers them originally to have been part of a large cemetery that fell into disuse as the town of Akrotiri extended and later transmuted into a memorial area for the dead, while Sotirakopoulou (2008) argues for a domestic function already in the EBA based on the coarse domestic pottery found inside.

MIDDLE BRONZE AGE

Towards the end of the Early Bronze Age, the island underwent a major change in settlement pattern. Fira and Archangelos were abandoned, while Ftellos and Ayios Ioannis Eleimon prospered. The settlement of Akrotiri grew steadily both in size and in importance. Unlike other Cycladic islands where scholars observed a trend towards settlement nucleation, Ftellos, Ayios Ioannis Eleimon and Akrotiri continue to co-exist throughout the Middle Bronze Age (Palyvou 2005: 15–16).

Unfortunately, the architecture of the Middle Cycladic town underlies Late Cycladic I structures and has therefore not been systematically explored. However, stratified and unstratified remains of this period have been found widely distributed across the site and indicate continuity in occupation throughout the Middle Bronze Age even if it is not yet possible to identify clearly defined building phases (Nikolakopoulou et al. 2008). The Middle Cycladic town is said to have been similar in extent to the succeeding Late Cycladic I town, though its layout may have been slightly different as the orientation of buildings and location of open spaces reveals (Doumas 1983: 42–43; Nikolakopoulou et al. 2008; Nikolakopoulou 2013). Akrotiri had now developed into an urban centre with paved streets, and a drainage and sewer system. Evidence of strong foundations and thick walls make it likely that many houses already had two storeys. Some houses were decorated with wall paintings (Forsyth 1997: 34).

The archaeological evidence indicates that craft specialisation developed alongside primary occupations, such as agriculture and animal husbandry. Technological improvements in fabric preparation and firing, and the introduction of new shapes hint at the existence of specialised pottery workshops on Thera as dark burnished or slipped, Cycladic White and bichrome wares were all produced locally. Typical pottery shapes include the Cycladic cup, side-spouted jug, beaked jug and jar (Papagiannopoulou 1990, 1991). Theran exports, for example, have been identified on Kea and Aegina (Nikolakopoulou et al. 2008). The rather popular Cycladic White and bichrome wares with naturalistic decorations were exported to other Cycladic islands and Crete, and have been shown through chemical analysis to have a Theran and Melian provenance (Kilikoglou et al. 1990; Vaughan et al. 1995; Hilditch 2008: 260–262). Indirect evidence exists for textile working, ship-building, masonry, carpentry, obsidian working and stone carving (Doumas 1983: 43; Doumas 2010: 754).

While the local pottery tradition was strong, Therans were very open to cultural and stylistic influences from Crete, as well as the Cyclades and the Greek mainland. Regular interaction with other Cycladic islands existed throughout the period. Contacts with Crete began in the early Middle Cycladic period and gradually increased in intensity. Imported vessels, such as the Minoan Kamares and Light-on-

Dark wares, exerted a considerable influence upon the local ceramic shape and decorative repertoire, and local imitations (e.g. hemispherical cup, straight-sided cup, saucer, conical cup, bridge-spouted jar) were common in the later phases. It was not only styles and shapes that were adopted by local potters but technological aspects as well. Towards the end of the Middle Bronze Age, the tell-tale rilling on some vessels indicates that local potters increasingly used the potter's wheel for the manufacture of local imitations of small Minoan shapes while the majority of the traditional shapes continued to be made by hand (Papagiannopoulou 1990; Nikolakopoulou et al. 2008; Nikolakopoulou 2013). This phenomenon of increasing Minoan influence in style, technology, practices and ideology is called 'Minoanisation' (see Chapter 6).

Close contact also existed with the Greek mainland as is evidenced by Matt-Painted Middle Helladic pottery (barrel jar, hydria, amphora, panelled cup) that was imported to Akrotiri in considerable amounts. These shapes were also copied locally. Unlike other Cycladic sites where Greek 'Minyan' ware was very popular, no fragment has yet been discovered from the Akrotiri excavations (Doumas 1983: 42–43). Imports from other Cycladic islands were common and included pottery from Melos, Kea, Naxos and Aegina.

The transition from the Middle to the Late Bronze Age was marked by a thick destruction horizon (the so-called Seismic Destruction Level) that spread across the entire excavation site. This destruction caused major damage to town buildings and was most likely caused by an earthquake. Middle and Late Cycladic pottery are represented almost equally in the debris which dates the destruction event to a time when Middle Cycladic styles were still in common use, but were being replaced by strongly Minoanising features typical for the Late Cycladic I period (Nikolakopoulou 2013). The community quickly recovered and rebuilt their houses (Doumas 1983: 43–44).

LATE BRONZE AGE

A dense settlement pattern characterises Thera during the Late Bronze Age. Well-known sites are Ballos, Therasia, Archangelos, Katsades, Kokkino Vouno, Potamos and Akrotiri (for details see Forsyth 1997: 45–49). In addition, there is evidence of hamlets, villages and farmsteads. Architecture and portable objects from these sites indicate a similarly affluent lifestyle to that familiar from the Akrotiri excavations.

Town plan and key architectural features

Approximately 10,000 m^2 of Akrotiri have been excavated since 1967 (Figure 7.3). Doumas estimates that this represents only a small fraction of the ancient town, which might have been as large as 20 ha or even 30 ha. While the total size of Akrotiri remains conjectural, there is no doubt that it must have been a large urban centre (Doumas 1983: 45; Palyvou 2005: 27). Population estimates vary widely between 150 and 400 persons per hectare. At 30 ha, Akrotiri may have accommodated as many as 4,500–12,000 inhabitants. If only 10 ha in size, population numbers would have ranged between

1,500 and 4,000. Considering that the entire population of modern-day Thera and Therasia is barely above 10,000, Palyvou believes the smaller settlement size and a lower population density to be more likely (2005: 29).

Akrotiri consisted of large multi-storey buildings either detached or, more frequently, arranged in blocks with abutting house walls. Sector Delta, which consists of four houses, is an example of the latter construction. The buildings themselves have been subdivided into two size groups: town houses (with a ground floor of 90–190 m^2) and large mansions (300–370 m^2). Mansions (*Xestes*) can be found in an area dedicated to public buildings in the south and southeast and probably fulfilled a communal function (Palyvou 2005: 29).

A well-organised street network that consists of main streets, side streets, alleys and cul-de-sacs gives the appearance of a planned town layout that follows an approximate north-south and east-west orientation (Palyvou 2005: 29–34): Telchines-Daktylon Street is one of the main traffic arteries that runs north-south through the town for a length of 120 m. Koureton Street, on the other hand, runs east-west, but is not preserved for as long a distance. Main streets are up to 2.20 m wide and paved with large flat stones; in some locations, a draining system runs underneath the street surface. Houses often protrude into the street and create an undulating street profile. Side streets branch off main streets and are narrower. Daimonon Street, for example, runs north-south and varies in width between 1.20 and 1.70 m. Most of the other side streets are not yet excavated.

Open public spaces are common at Akrotiri: Triangle Square, Mill House Square, Square of the Cenotaph, Square of the Double Horns, Square of the Benches – to name but a few (Figure 7.4). It is

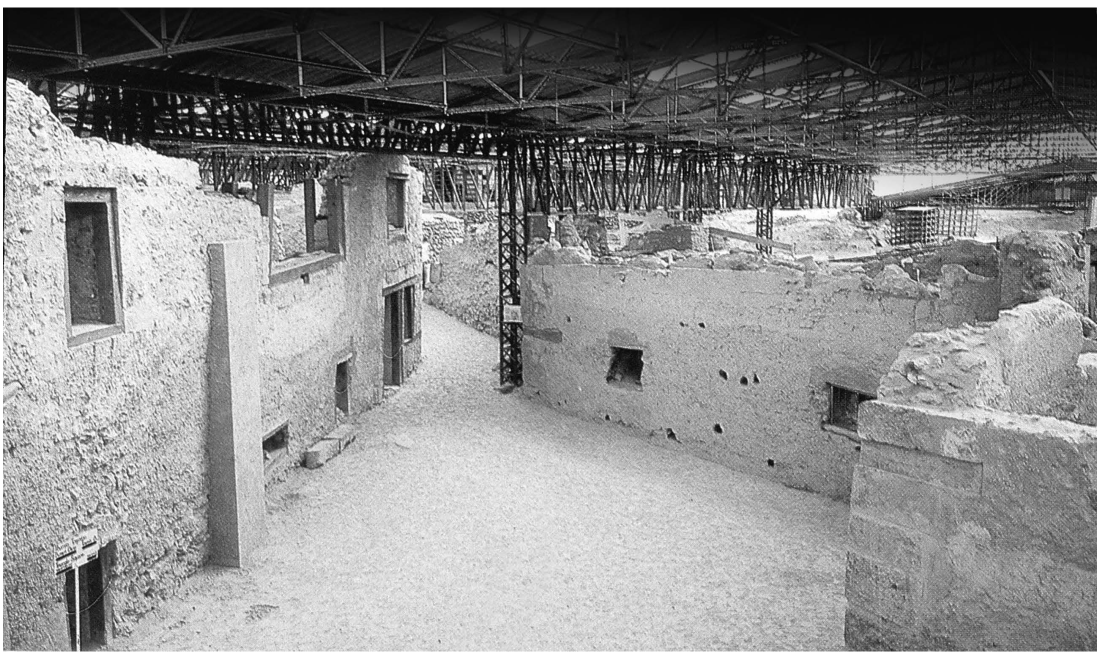


Figure 7.4 Triangle Square, Akrotiri (Palyvou 2005: Fig. 35). With permission from C. Palyvou. Image courtesy of INSTAP Academic Press.

uncertain whether squares were planned or developed organically as the town grew and was rebuilt over time. Public drainage channels are visible underneath the paving of some of the squares. In addition to public squares, there are also backyards and service areas connected with individual buildings (Palyvou 2005: 35–39).

Public draining systems were a common feature of Bronze Age sites in the Aegean. What makes Akrotiri unique is the linkage of domestic water supplies (including a lavatory) to the public sewage system. Clay or stone spouts are found embedded in several building walls and transported liquid waste from industrial or domestic activities to the outside. The best preserved example of a lavatory can be found in the West House: a set of pipes leads from a stone-built seat on the upper floor to a large outside pit that acted as a settling tank. The tank, in turn, was connected to the public sewer system. Underground sewers that ran underneath street surfaces and public squares then transported waste water and rainwater to the sea (Figure 7.5). These sewage channels were ca. 0.30 by 0.25 m in size and were constructed of stone or clay (Palyvou 2005: 39–43).

So far, no traces of fortifications have been uncovered and Akrotiri thus appears different from contemporary Cycladic towns.

Architecture

The excavations have revealed evidence of 35 different structures. Of these, only ten buildings have been studied comprehensively. They are Sectors Alpha, Beta, Gamma and Delta, the House of the Ladies, the West House and Xeste 2, Xeste 3, Xeste 4 and Xeste 5. Most buildings have a second, or even third, floor. Xestes are considered particularly large and imposing buildings, often built with ashlar facades.

While each building is different in orientation, size and room arrangements, there are some overarching building principles that are shared by most buildings: 1) a window is next to the entrance door; 2) basements have small windows to aid air circulation; 3) upper floor windows were large; 4) multiple connected horizontal timber frames filled with unworked stone and clay were used to construct house walls; 5) ashlar masonry was used to frame doors and windows and give extra strength to house corners; 6) interior walls were made of lighter materials, such as stone and clay mortar, timber frames filled with clay and straw, or mudbrick; 7) windows and doors were made of wood; 8) staircases were built of stone or wood; 8) earthen floors were the rule for ground floor rooms except the vestibule which was often paved with stone flags; floors on the upper storeys were earth-covered constructions of timber beams, branches, reeds and rubble. In exceptional places stone flags were laid on top; 9) roofs were constructed in a similar way to upper floors – with the addition of a central wooden pillar or a polythyron if the width required (Doumas 1983: 51–53; Palyvou 2005).

Architecture and small finds can provide valuable clues to determine the function of a room or building. For example, the presence of large jars (*pithoi*) and tools (e.g. stone hammers, anvils) in basements supports their interpretation as storerooms and/or workshops. Mill installations – consisting of grinding stones, stone mortars, pestles and grinders – are commonly found in houses. Upper floors probably served as residential quarters, though specific function areas are difficult to discern. A Minoan-type

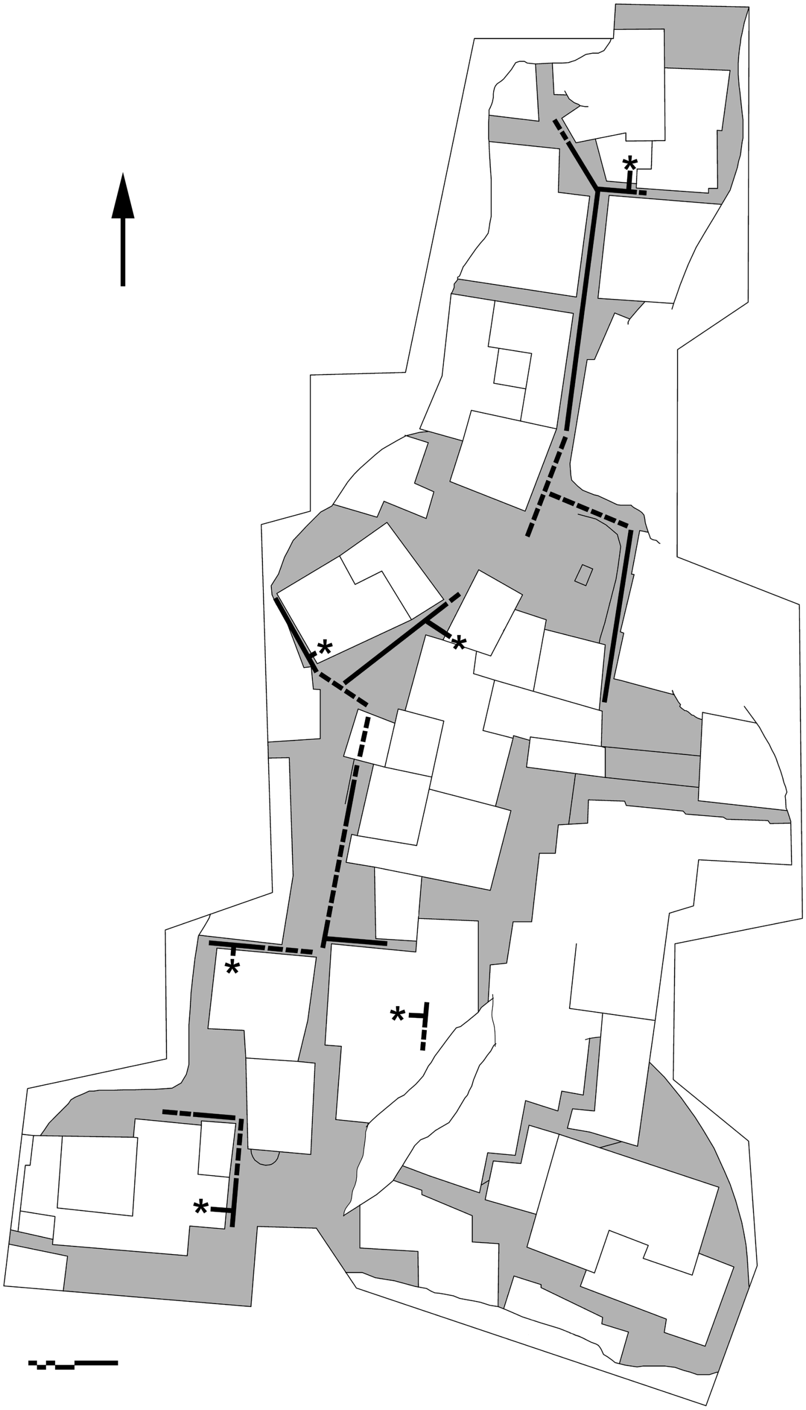


Figure 7.5 Plan of public sewage system (Palyvou 2005: Fig. 42). With permission from C. Palyvou. Image courtesy of INSTAP Academic Press.

lustral basin is located in the basement of Xeste 3 and the "Room of the Lilies" in Building Delta-East contained two offering tables and two boar-head rhytons (Doumas 1983: 53–54).

The West House

The West House is an example of the typical Akrotiri house. It is a three-storey free-standing building framed by the Triangle Square to the north and Telchines Street to the east. The house's entrance faces Triangle Square. In total, 16 rooms provide 345 m^2 of floor space (Figure 7.6); two staircases connect the different floors with each other. Eight rooms can be found on the ground floor. The entrance door opens into a vestibule (Rooms 1 and 2) and the main staircase. The room arrangement enforces a clockwise linear movement from Room 1/2 to Room 6/7. Finds and built installations indicate that the ground floor was used for industrial activities and storage. Three millstones sunk into a bench have been uncovered from Room 3a and indicate its use for preparing flour. A metal workshop was originally said to have been located in Room 4 where a stone mortar, pounder-grinders, stone tools, a jar, two cooking pots filled with a white substance and possible ore had been found. However, this substance has now been reclassified as emery which is used for polishing finished artefacts (Forsyth 1997: 72). Rooms 5 and 6 contained abundant pottery remains and were probably used for storage. The first floor consists of seven rooms which, again, follow a linear clockwise arrangement. From the landing one enters into Room 3, the largest room of the house (34 m^2), whose ceiling is supported by a central column. Not only is this the largest room in the West House, but it is also the second largest in Akrotiri overall – only Room 16 in Building Delta-South is larger. A large window (ca. 3.2 m wide) overlooks Triangle Square, and finds of over 450 loomweights attest to this room having been used for weaving. Archaeologists believe this central, large room to have been the main hub of the home. Rooms 5, 4 and 4a contained several famous wall paintings and were the most luxurious rooms; they are generally interpreted as a suite consisting of living room, bedroom and lavatory respectively. Room 5 was paved with red painted slabs and its walls were constructed of timber with multiple windows and doors – creating a veranda-like effect. Frescoes were fitted in-between, above and below these openings: the 'Fishermen Frescoes' were found in the northeast and southwest corners, the 'Priestess' fresco on the east door jamb leading to Room 4, and the 'Miniature Frieze' on the north, south, east and perhaps west walls above the various openings, and a painted panel of marbling effect beneath the windows of the northern and western walls (Figure 7.7). As the name implies, the 'Miniature Frieze' is a small-scale wall painting varying in height between 20 and 43 cm in height and originally probably 16 m long. Nowadays, only ca. 7.5 m survive. It contains several famous scenes, such as 'The Meeting on the Hill', 'Shipwreck', 'Warriors', 'Nilotic Landscape' and the 'Ship Procession' (also called 'Flotilla'). In addition, small finds included several vases and a painted table of offerings. Room 4 has a lime plaster floor. The walls were decorated with various frescoes, including the 'Captain's Cabins' (*ikria*) fresco, flower pots and imitations of veined stone. Room 4a is the well-known lavatory (Figure 7.8): a narrow gap between two stone benches leads to a set of vertical clay pipes that were embedded into the exterior

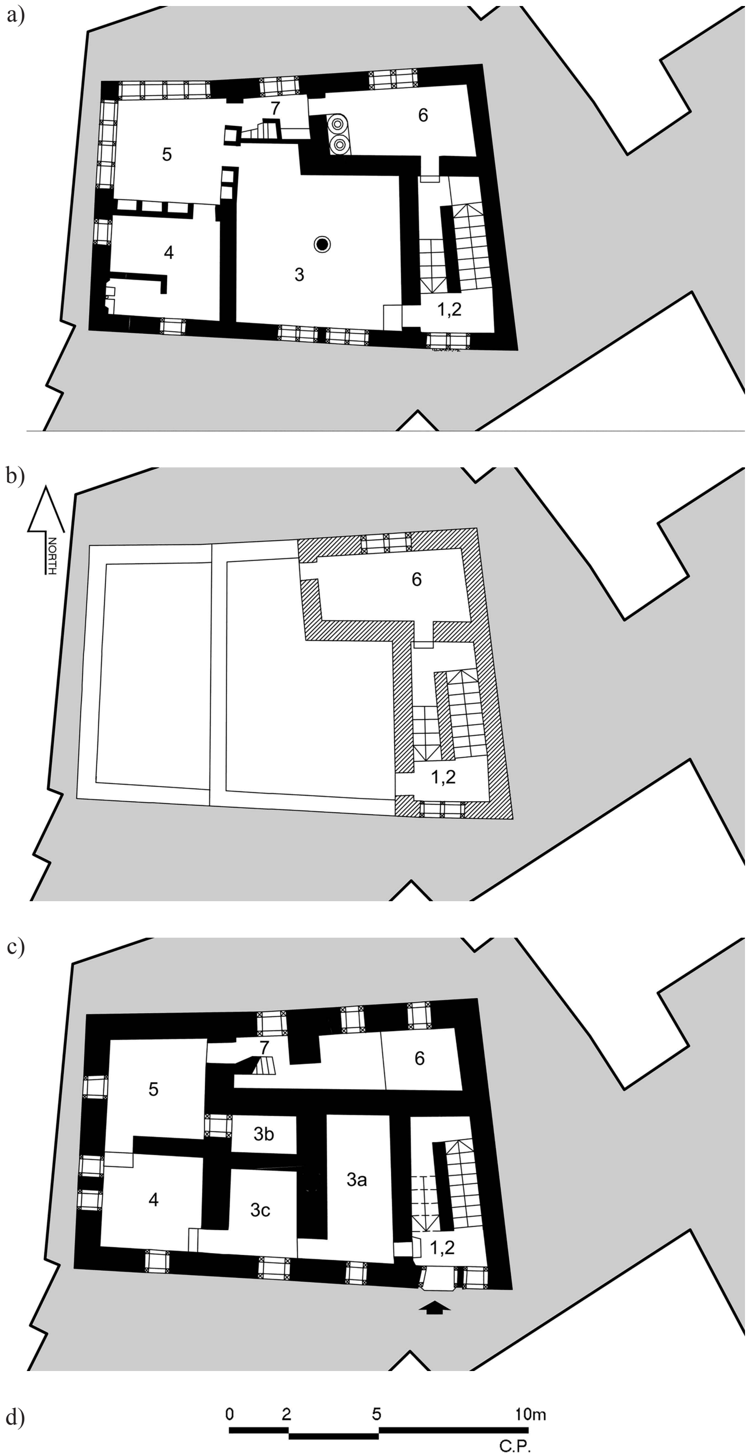


Figure 7.6 Plan of the West House (Palyvou 2005: Fig. 46). With permission from C. Palyvou. Image courtesy of INSTAP Academic Press.

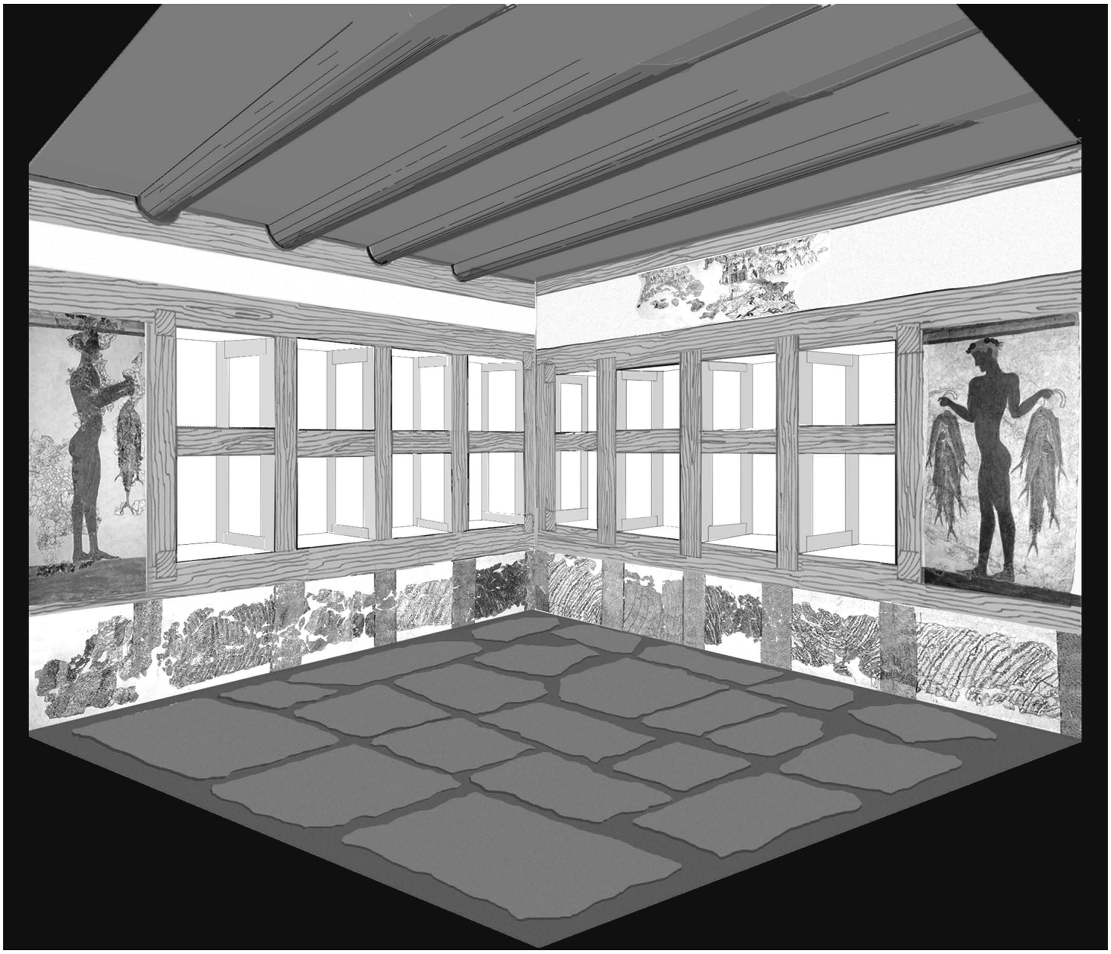


Figure 7.7 Reconstruction of Room 5 in the West House (Palyvou 2005: Plate 3A). With permission from C. Palyvou. Image courtesy of INSTAP Academic Press.

wall. These clay pipes channelled waste fluid downward into a large pit located in the narrow western alley. The pit was connected to the town's sewer system. Other finds in Room 4a were a bathtub, a bronze tripod vessel and a tripod offering table as well as pots containing red pigment and fresh plaster. From Room 5 one enters into Room 7 which contained two cupboards filled with more than 200 pots, a stone bench and the second staircase that links the first floor to the ground floor. Two pithoi embedded in a bench were found in Room 6 together with a number of vases (including over 100 conical cups) that had fallen off a shelf, stone tools, stone lamp and 26 lead discs; this room probably functioned as a storage room. The second floor consists of a single room in the eastern section and was accessed via the main staircase which continued upwards onto the roof (Palyvou 2005: 46–53; Forsyth 1997: 71–81; Doumas 1983: 82–106).

Figure 7.8 Lavatory in Room 4a, West House (Palyvou 2005: Fig. 59). With permission from C. Palyvou. Image courtesy of INSTAP Academic Press.

Sector Alpha

Sector Alpha consists of two separate buildings: Alpha-East and Alpha-West (see Figure 7.3). Excavations of Alpha-East have revealed a two-story building with a total floor area of ca. 200 m^2 (Palyvou 2005: 86–89). The ground floor is well preserved and consists of three rooms. The house entrance is located at the southwest corner and leads into a small lobby from which a small staircase ascends to the first floor. Room Alpha 1 is large (4.9 x 5.1 m) and has a central column to support the ceiling. Seven large pithoi were found placed alongside the north and south walls and some still contained traces of barley flour. A low-set, large window faces the public street towards the east and has been interpreted as a shop. A hearth with traces of fire is embedded in the floor, and a stone basin, tripod cooking pot and grinding stones are among the finds from this room. Room Alpha 2 (3.2 x 5.4 m) served as an annex to Room Alpha 1. It is subdivided into several compartments by thin clay partitioning walls which contained storage vessels. The most notable finds are a clay chest and lead weights, but the majority of finds are vessels, lamps and a lion's head rhyton, some of which had fallen from the upper floor. Room Alpha 3 (2.75 x 5.5 m) consists of a western and eastern section. With pithoi arranged along the walls,

the western section functioned as a storeroom, while the eastern part looked out onto the street. The first floor of Alpha-East is virtually unknown, though its arrangement appears to have mirrored the room division of the ground floor. Loomweights had fallen into Room Alpha 1 and indicate that weaving must have taken place on the first floor.

Alpha-West abuts Alpha-East, but is only partially uncovered. Access to the house is from the West. The entrance, which preserves traces of the door pivot hole and a bolt, leads to the lobby that contains a built bench. The so-called mill house is an annex to the entrance lobby. It is a mill installation with millstones found embedded in benches. A clay tub links to a shallow built basin with a waste water outlet to the street outside. Three or more rooms were constructed towards the north and had at least one upper floor. As in the West House, the first room was large and probably had a central column, while another room showed traces of a polythyron (Palyvou 2005: 89–90).

Sector Beta

At least two houses constitute Sector Beta: Beta-South and Beta-North (Palyvou 2005: 64–68). The eastern part of both houses was badly damaged by a modern torrent (see Figure 7.3).

The entrance to Beta-South was probably located on the ground floor northeast of Room Beta 2; Rooms Beta 3 and 4 may have been part of the entrance arrangement. Room Beta 2 has a small westward-facing window and was filled with cooking pots and everyday pottery. A stone base for a wooden column acted as the structural support for the room above. A small corridor leads to two long, narrow rooms (Rooms Beta 2a and b) which are unexcavated. They originally constituted one single room which was subdivided to act as the supporting wall for the enlarged upstairs Room 2. Rows of pithoi are embedded in benches along all sides of Room Beta 1. Further vases and rhyta were uncovered and speak of the room's function as a storage room. Room Beta 7a leads to the auxiliary staircase that has a small window. Interestingly, an outflow pipe was found embedded in the external wall of this room. Moving further east we reach Rooms Beta 6 and 7 which contains several small windows. The well-known 'Blue Monkeys' fresco fragments were found here and had probably fallen from the first floor. On the first floor, Room Beta 2 is of the typical square size (4.9 x 5.4 m) and contains the usual central column. It was paved with large slabs. Since no loomweights were found in this room, the building had probably already been abandoned. A small paved corridor leads to Rooms Beta 1, 1a and 1b. Room 1 had a paved floor and a large window facing north across the Square of the Mill House. The room was equipped with openings and cupboards and all wall surfaces were painted with beautiful frescoes. They are the famous depictions of antelopes and a pair of boxing boys. Rooms 1a and b served as annexes. Beta 1a contained four small clay repositories and a cupboard, and was covered in its entirety by lime plaster. Another lobby area (Room Beta 7) leads to the auxiliary staircase that connects the first and ground floor.

Beta-North is a set of three rooms (Beta 5, 5a and 8) that was added between Sector Delta and Beta-South to join these two sections and was probably accessed from the Square of the Mill House. They probably acted as an auxiliary building of unknown function (Palyvou 2005: 68).

Sector Gamma

This sector consists of two houses named Gamma-North (also called Building IΓ) and Gamma-South that are separated by a narrow alley (see Figure 7.3). Only two rooms from Building Gamma-North have been excavated: Rooms Gamma 9 and 10. The former revealed three beds and several clay pots that had been put in storage there after the earthquake (Palyvou 2005: 68).

Gamma-South is a free-standing building constructed over two storeys – a basement/ground floor and first floor. The total surface area encompasses 288 m^2. One enters the building on the first floor from Telchines Street. This is due to the accumulation of debris from various earthquakes that raised the street surface by up to 1.5 m and hence required the elevation of the entrance level; the former ground floor became a semi-basement. The staircase (Room Gamma 6) that leads off the lobby (Room Gamma 5) up one flight of stairs to Room Gamma 7 and then further upwards to the roof. Room Gamma 7 is a large square room (ca. 5.1 x 4.9 m) with a column at the centre. A large window was probably located in the western wall. Rooms Gamma 4 and 4a could be accessed from Gamma 6 and 7. Gamma 4a, in turn, leads to a staircase that connected to the semi-basement rooms Gamma 1, 2, and 2a which probably functioned as a workshop. Of these, Gamma 1 brought to light many stone and metal objects that testify to some kind of metallurgical activity in this room. The door in this room is secondary to permit access after parts of the house had become inaccessible. Of the semi-basement, only Room Gamma 4a was fully excavated (Palyvou 2005: 69–71; Forsyth 1997: 60–61).

Sector Delta

Sector Delta occupies the centre of the excavation and consists of four separate houses, each with its own entrance: Delta-South, Delta-West, Delta-North (also known as Xeste 1) and Delta-East (see Figure 7.3).

Delta-South has two storeys which cover a total surface area of 264 m^2 (Figure 7.9). One enters the house from the Square of the Mill House. The entrance consists of the typical door-and-window arrangement that is framed by ashlar masonry. The lobby (Room Delta 15) has two stone benches, one of which has millstones embedded in it. The main staircase leads down to the other semi-basement rooms and up to the first floor. The largest room in the semi-basement is Room Delta 16 (4.9 x 7.10 m) with a central column and a large west-facing window. This room is single-storey as its dimensions were too large to support an upper floor. Over 450 artefacts were found here, including "storage jars, remnants of a bronze scale, fragments of bronze tools, bronze vases, lead discs, a stone lamp, a steatite vase, a marble basin and chalice, an alabaster lid, a whet-stone, a schist writing tablet, silver rings and a jasper gem depicting a griffin and a dolphin" as well as triton shells and ostrich eggs (Forsyth 1997: 68). Scholars have debated the possible function of this room and three main hypotheses have been advanced: 1) storage and safe-keeping, 2) shop; or 3) cult storeroom. Forsyth believes that the diversity of finds makes option 1) the most likely scenario (1997: 68). Towards the back are Rooms Delta 10–13.

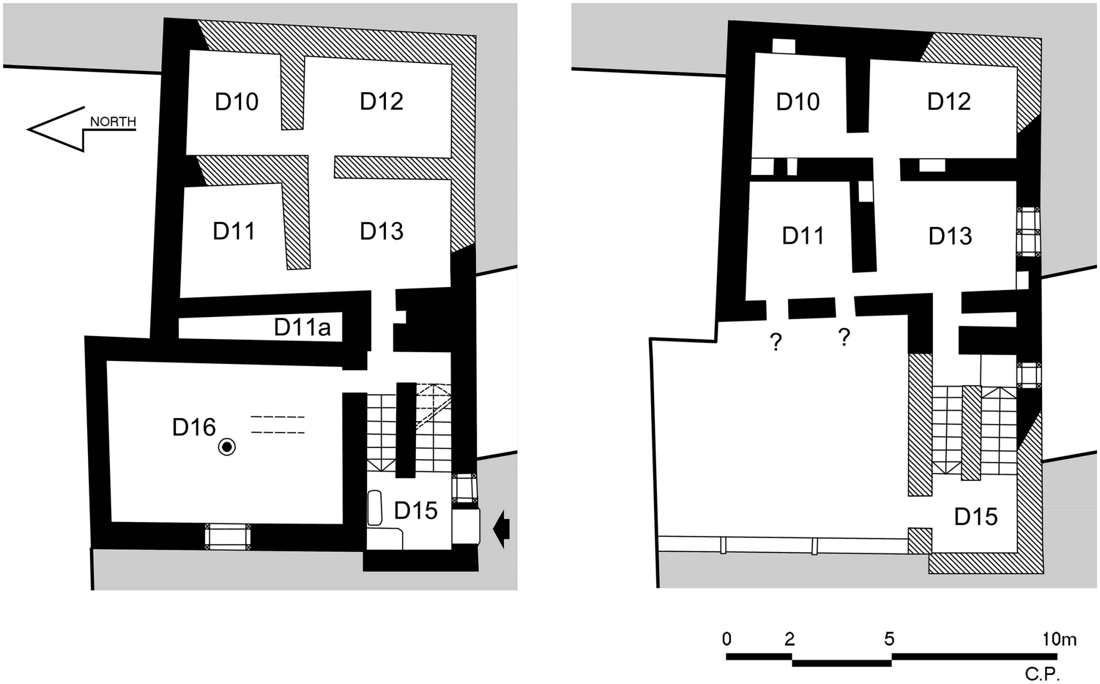


Figure 7.9 Plan of Delta-South (Palyvou 2005: Fig. 90). With permission from C. Palyvou. Image courtesy of INSTAP Academic Press.

Little can be said about these semi-basement rooms, but it is assumed that their layout corresponds to that of the first floor. Finds from Room 11 debris include a pithos and a large fragment of a stone horns of consecration. Rooms 11–13 on the first floor all have small niches covered with plaster. Room Delta 13, the largest room, has a wide window; a niche full of loomweights suggest that this room was used for textile manufacture (Palyvou 2005: 71–75; Forsyth 1997:65–71; Barber 1987: 208–211).

Covering an estimated surface area of 389 m^2, Delta-West spread out over two storeys (Figure 7.10). The house lies at the centre of Complex Delta and was accessed from the west underneath the so-called Gate or Pylon that was constructed after the seismic destruction to redirect the flow of rainwater. The typical entrance door-and-window arrangement exists and is framed by ashlar stones. The lobby opens to the main staircase. From the lobby one enters Room Delta 1a, a large rectangular room (3.5 x 7.3 m) with one or two pillars in the centre that probably functioned as a storeroom and kitchen. In addition to abundant pottery, the room also contained a large bathtub and a stone hearth. A small window looks out onto Triangle Square. The two northernmost rooms have not yet been excavated. An auxiliary staircase probably existed in the southeast section of the ground floor. Rooms Delta 9 and 9.1 revealed over 300 local and imported pottery vessels, including a rhyton painted with crocuses and a Syrian amphora; a door in the eastern wall may have led to a private terrace. On the first floor, Rooms Delta 9 and 9.1 are connected by a polythyron. From here, one enters the largest rooms in Akrotiri (Rooms Delta 1 and 1a) that are joined by a polythyron arrangement. Constructed of six doors

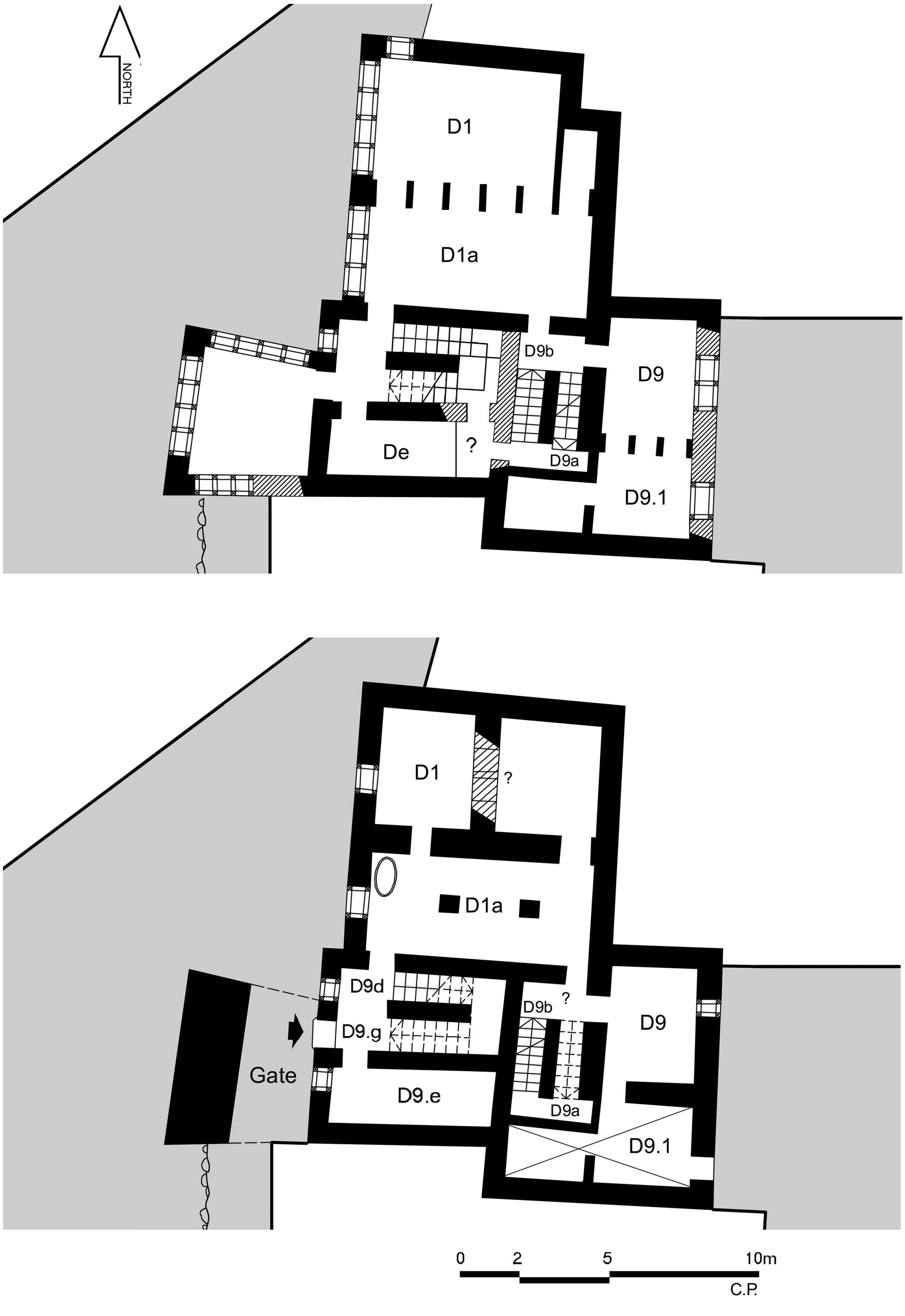


Figure 7.10 Plan of Delta-West (Palyvou 2005: Fig. 99). With permission from C. Palyvou. Image courtesy of INSTAP Academic Press.

and totalling 7.3 m in length, it is the longest polythyron found at Akrotiri. Each room had large pier-and-window partitions that faces west towards Triangle Square. Many loomweights were found near the windows. Thanks to its even more extensive pier-and-window partitions, the room above the Gate has a surround view towards the north, west and south, and must have been a pleasant space to live or work in (Palyvou 2005: 75–80; Forsyth 1997: 65–71).

Delta-North (Xeste 1) is around 317 m^2 in surface area that spreads out over three storeys (Figure 7.11). The entrance to the house faces the Square of the Cenotaph in the north. The interior room arrangement is not altogether clear as this part of Sector Delta is badly damaged. The entrance door leads into a paved lobby (Rooms Delta 4 and 5) from which the main staircase ascends to the upper floor and descends into Room Delta 6, a semi-basement space, and then to Room Delta 3, the basement. This room's floor was paved. Large quantities of pots were found on the floor and a niche in the north-east corner. In addition, a hoard of three bronze vessels and two bronze trays was uncovered under the paved floor. Climbing upwards one reaches the middle landing (Room Delta 7) that also connects to the auxiliary staircase. Room Delta 7 revealed a circular grinding stone and a hearth. Clay pipes by the wall

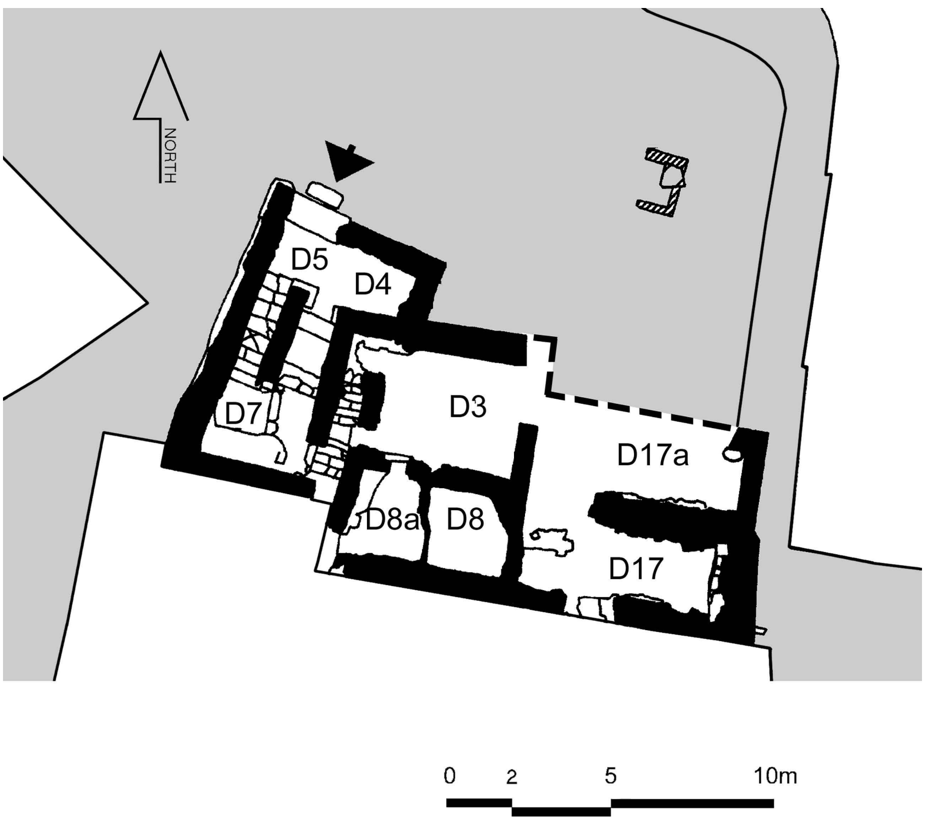


Figure 7.11 Plan of Delta-North (Palyvou 2005: Fig. 107). With permission from C. Palyvou. Image courtesy of INSTAP Academic Press.

may indicate the existence of a lavatory that was connected to the street's drainage system. From the landing, stairs lead upwards to Rooms Delta 4 and 3 on the first floor. Room 8a contained several mud-brick box-like structures, lead weights, a whet-stone, a bronze dagger and a lead cross. A tripod offering table depicting dolphins in a marine environment was found near Room 8. Room 8 was decorated with a sea pebble mosaic floor and incised white plaster on the western wall. A polythyron can be found in the eastern wall and opened onto a roof veranda above Room Delta 17. The veranda had a spout built into it, presumably for rainwater run-off. Rooms Delta 17 and 17a are badly damaged, but fresco fragments have been reported from this section (Palyvou 2005: 80–83; Forsyth 1997: 65–71).

Delta-East is the smallest house in Akrotiri (see Figure 7.3). It has two storeys which cover an estimated total surface area of 192 m^2. A wide entrance door, with the typical adjacent window, leads into a lobby (Room Delta 19) from which the main staircase ascends to the first floor. Room Delta 21 is a large, square room (3.5 x 4.3 m) supported by a central column and with a large window facing south. Three smaller rooms and the auxiliary staircase lead off this room. Room Delta 2 was fitted with a mosaic floor and contains the famous "Spring Fresco" on the north, west and south walls. The fresco depicts a colourful landscape with rocks and clusters of lilies above which swallows fly. The room's architectural features include high shelving along the west wall and a cupboard crammed with pottery. A door and window in the east wall are miniature versions of the polythyron arrangement that existed originally. The room was furnished with a 1.6 x 0.7 m large bed, a stool, and many smaller and larger storage vessels (Figure 7.12). Rooms Delta 18a and 18b were storerooms filled with vases, furniture fragments and, most notably, Cretan clay sealings and Linear A tablet fragments. The first floor mirrors the ground floor room layout except that Room 18 is now a single large room with a central support column. The eastern wall of Room Delta 18 containes a pier-and-window partition. The room floor consists of a mosaic of sea pebbles in a mortar base. No evidence survives of Room Delta 21, but it was probably similar in dimensions and layout to the room below. Remains of stone bases indicate that a polythyron arrangement linked Rooms 21 and 2 (Palyvou 2005: 92–95; Forsyth 1997: 65–71).

Xeste 2 and Xeste 5

Xeste 2 and Xeste 5 border the Square of the Double Horns to the north and south respectively (see Figure 7.3). Xeste 2 has three floors and must have been a major building in the town. Only its northern wall has been excavated which is 23 m long and has a large window in the centre of the upper floor. Ashlar masonry is used in the northwest corner. Excavations of pits have revealed glimpses of the interior: slab-covered floors, and vessels indicative of a storeroom. Among the small finds was a vase with incised Linear A symbols and a sealed ewer that contained seeds (Forsyth 1997: 86–88; Palyvou 2005: 96).

Xeste 5 is not fully excavated, but appears to conform to the layout of a typical Theran house. Unusually, the façade of this substantial building is entirely constructed of ashlar masonry. Multiple window openings belong to a large square room that probably had a central column, and remains of at least one staircase have been located. Finds include a large stone vessel and a paved floor (Palyvou 2005: 90–92; Forsyth 1997: 86–88).

Figure 7.12 Room Delta 2 with the gypsum cast of a bed and the Spring Fresco wall painting (Palyvou 2005: Fig. 130). With permission from C. Palyvou. Image courtesy of INSTAP Academic Press.

Xeste 3

The second largest building in Akrotiri, Xeste 3 is almost completely excavated. Its layout does not follow the typical Theran design and Palyvou therefore classifies it, together with Xeste 4 and possibly the House of the Ladies, as 'atypical' (2005: 54). The building is located in the southernmost section of the excavation close to the postulated ancient harbour. It is surrounded by public squares on the north, east and south (Square of the Lustral Basin, Square of Xeste 3 and Square of the Benches respectively). At least two facades (north and east) are made entirely of ashlar masonry. Xeste 3 has more than 35 rooms spread over 3 floors with an estimated total surface area of 620 m^2 (Figure 7.13). In addition to its size, Xeste 3 stands out among the houses for the quality of its construction, the complex room arrangements and outstanding wall paintings (Vlachopoulos 2008).

Having passed the stone bench outside the entrance, one enters the building on the ground floor through an east-facing door. The typical entrance door and window arrangement leads into a lobby (Room 5) from which the main staircase leads upstairs to the first floor. The impressive lobby is paved with slabs and contains two stone benches. The walls have revealed wall paintings of males involved in hunting bulls and goats. The staircase is colourfully decorated; not only did the stone steps have stucco

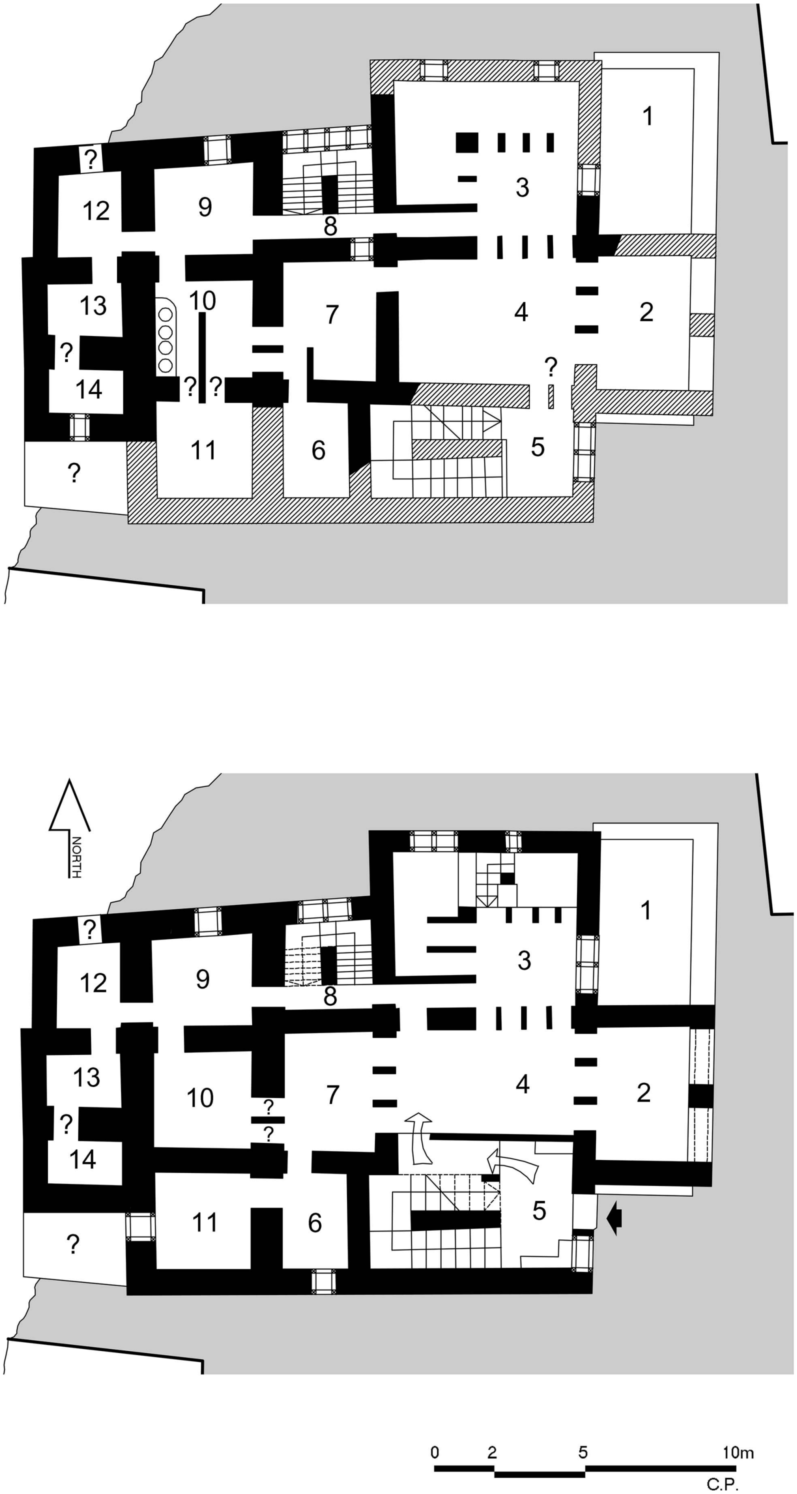


Figure 7.13 Plan of Xeste 3. Top: first floor; Bottom: ground floor (Palyvou 2005: Fig. 62). With permission from C. Palyvou. Image courtesy of INSTAP Academic Press.

applied and were painted red, but wall paintings depicting a mountainous landscape extended into the staircase. Through a double door the lobby leads to Room 4. Room 4 is a central room with no exterior wall. Surrounded by polythyra arrangements in the east, north, and west, it regulates movement and communication between all areas of the ground floor. A 20-cm-thin frieze runs along the top of the partitions which depicts an exotic landscape with swallows and blue-coloured monkeys. To the east lies Room 2. It contains a low stone basin with an outlet that transported waste fluid outside and, next to it, a clay tub. A wall painting frieze depicting rosettes and spirals ran atop the partition wall and a large wall painting shows a subtropical landscape with prey and predator animals. Two large windows face eastwards onto the Square of Xeste 3. Originally, Room 2 could be entered directly from the outside, but the door and window were subsequently blocked off. To the north of Room 4 lie Rooms 3, 3a and 3b as well as the auxiliary staircase (Room 8). Room 3 is paved and divided into small space units by a polythyron and thin clay partitions. The most notable feature is the lustral basin in Room 3a (Figure 7.14). Lustral basins are a well-known ritual architectural feature from Minoan Crete which

Figure 7.14 The lustral basin in Room 3a, Xeste 3 (Palyvou 2005: Fig. 73). With permission from C. Palyvou. Image courtesy of INSTAP Academic Press.

are thought to have functioned as a place for libation rituals, most likely connected with chtonic deities. It is 3.30 x 1.8 m in size and L-shaped steps lead downwards around a pier into a sunken basin. Its floor and lower section of the walls are paved with stone slabs. All walls of Room 3a were lavishly decorated with wall paintings, such as the "Adorants" and "The Shrine". The western compartment (Room 3b) depicts three young males and a mature man who appear to participate in some kind of initiation rite. Room 1 is connected to Room 3 by a door and is considered a late addition. It probably supported the activities conducted in Room 3. The presence of the lustral basin, the intricate architectural arrangement and the wall paintings make a ritual function, quite possibly related to rites of passage, of the room highly likely. The western polythyron links Room 4 to Room 7 and from there to the western section of the house. Rooms 9–14 were much simpler in their construction and layout and probably represent a service/storage area.

The room layout of the first floor mirrors that of the ground floor, including the proliferation of polythyra. The only difference is that the polythyron between Rooms 4 and 7 has been replaced with a rubble wall. Many frescoes were discovered. Among the most famous is the "Crocus Gatherers" in Room 3 which relates thematically to the paintings surrounding the lustral basin. A narrow frieze of swallows and blue monkeys stretches across the top of the partitions in Room 2 and a procession of women is visible in the corridor leading to Staircase 8. Less complete wall paintings depicting humans, flora or fauna adorned Rooms 9–13. Room 10 is divided into smaller compartments through clay partitions and four pithoi were embedded into a stone bench that ran along the west wall. The second floor could only be accessed via the auxiliary staircase. It includes Rooms 7–11 and perhaps also Rooms 12–14, and probably opened onto a large east-facing terrace. Unfortunately, little architectural evidence survives and restoration of wall paintings is still ongoing. However, the presence of stone bases for several polythyra and large quantities of fresco fragments make it clear that the rooms were as lavish and elaborate as the remainder of the building (Vlachopoulos 2008).

High quality building materials and techniques (ashlar masonry with timber frames), size, frequency and extent of polythyra arrangements, interior decoration and presence of a ritual space make it apparent that Xeste 3 is not a typical Theran house. With all doors open, the polythyra would permit a large group of people to gather in Rooms 4, 2, 7 and 3. In contrast, closing some or all doors will regulate access and allow specific sections of the ground floor to be screened off. The lamps discovered in Room 4 may hint at activities that took place in relative darkness. Most likely, this building did not function as a private residence but rather as a public space for the performance of some kind of rituals. In contrast to the western part that served ceremonial purposes, the eastern section probably was a service/storage area (Palyvou 2005: 54–62; Forsyth 1997: 54–60).

Xeste 4

"Xeste 4 is the largest and most impressive building revealed to date" (Palyvou 2005: 96). Its total floor area is estimated to be around 960 m^2 and it extends over three floors (Figure 7.15). Unique at Akrotiri, all of its house facades are constructed of white and green ashlar masonry. Xeste 4 is situated

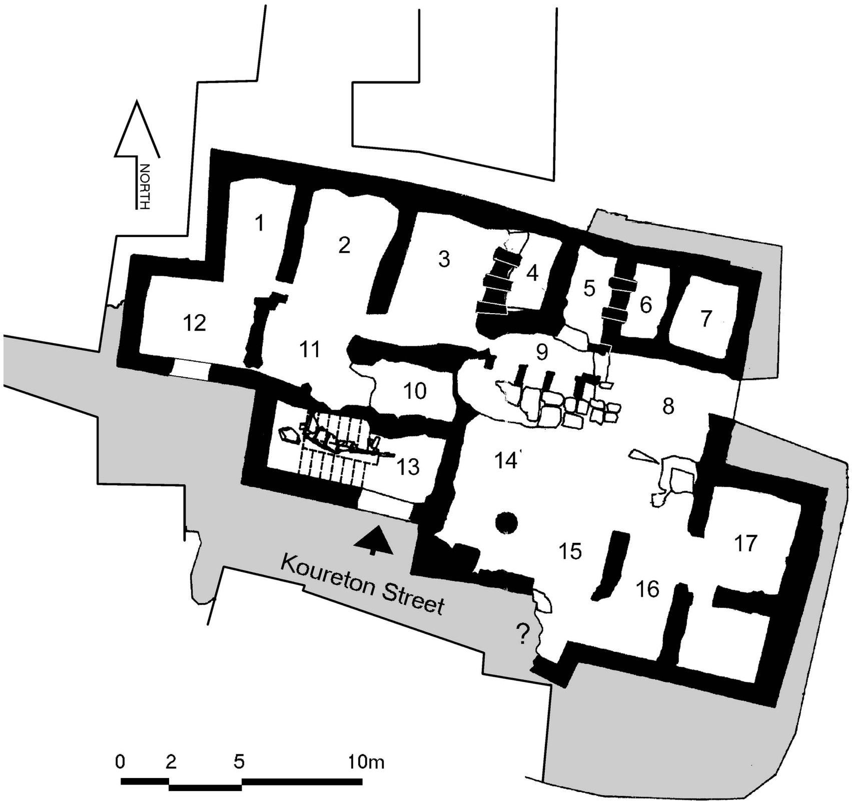


Figure 7.15 Plan of Xeste 4 (Palyvou 2005: Fig. 134). With permission from C. Palyvou. Image courtesy of INSTAP Academic Press.

along Koureton Street in the southernmost section of the town, close to the postulated harbour. Three staircases connect the floors with each other. Magnificent wall paintings have been unearthed and may depict some kind of processional scene with men ascending the main staircase. On the first floor, the house features the typical large square room (4.3 x 4.9 m) with a central wooden column and a large window; this room arrangement is mirrored on the ground floor. The second floor retains evidence of a polythyron in the northern part that opened up onto a veranda (Palyvou 2005: 96–98; Forsyth 1997: 88–90).

House of the Ladies

Named after the famous fresco found inside, the House of the Ladies is situated to the north of the West House and Complex Delta along Telchines Road. The house was badly affected by a 20th-century water torrent that damaged the south and east sides of the building. Like the West House, it was an independent building spread out over three floors which were connected by two staircases. The total floor space

is estimated to be 436 m^2 and there may have been as many as 10 rooms on each floor (Figure 7.16). The ground floor (which is more like a semi-basement) is not well understood. The most outstanding feature of this building is a light well at its centre. It measures 1.5 x 1.7 m and has three small stone-framed windows set in the north, east and west walls on the first floor; the south wall connects to the internal staircase. A corridor surrounds the light well to the north, south and west and allows light to penetrate the interior of the house (Sali-Axioti 1990). Fragments of wall paintings decorated the upper floor: the "Fresco of the Ladies" was found in the eastern section of Room 1 while lilies adorned the walls of the western compartment (Peterson Murray 2004). With regard to content and furniture, Room 1(west) held a set of clay bins that contained pottery and were covered by schist slabs. Large quantities of conical cups, triton shells and ivory fragments were found in the eastern section. On the second floor,

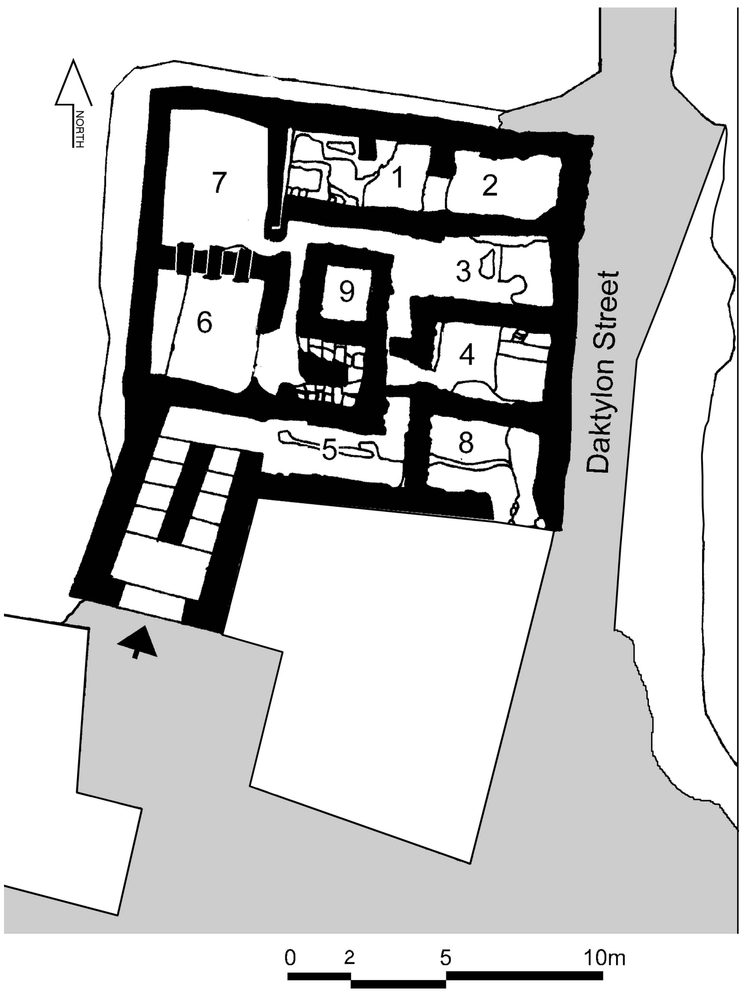


Figure 7.16 Plan of House of the Ladies (Palyvou 2005: Fig. 112). With permission from C. Palyvou. Image courtesy of INSTAP Academic Press.

Rooms 6 and 7 are connected through a polythyron arrangement. Finds from Room 7 show that large amounts of pottery were stored here at all three levels; some had fallen below following the collapse of the upper floors and include rhytons, breasted ewers, kymbai and triton shells. In addition to fallen finds, Room 7 (ground floor) contained many vases that had been placed along the walls. The large unfinished red marble jar found in Room 6 was probably imported from the Greek mainland and highlights the diverse contacts the occupants had (Palyvou 2005: 83–85).

LIFE IN AKROTIRI

Subsistence

Even though there is much evidence of trade, it is likely that the foundation of Theran life was rooted in agriculture and husbandry. The presence of agricultural instruments and tools (e.g. sickles, knives) and mill installations pay testimony to the primacy of subsistence in the lives of Bronze Age people. Faunal and floral remains attest the consumption of cultivated plants and domesticated animals. The islanders' main staple foods were cereals (barley, einkorn) and pulses (lentils, Spanish vetchling, peas) that were pounded to create bulgur or fava, ground to flour, or cooked. Pistachios and almonds were found preserved in jars and supplement the main dietary plans (Sarpaki 1992b, 2001). Olives were probably converted into olive oil and grapes into wine. As regards meat, sheep or goat were by far the most popular food source (approximately 70% of all animal bones), followed by pig (18%) and cattle (9%). Wild animals, such as dog, deer, and birds, are present only in minute quantities (Trantalidou 2000). The consumption of seafood was not very common, but included fish, sea-urchins, murex shells, and limpets that had been collected along the local shore and whose shells have been found discarded throughout the settlement and in containers. Land snails were popular snacks as is demonstrated by several medium-sized pithoi that were filled with white snail-shells (Karali-Yannacopoulou 1990). The preparation of foodstuff took place in small kitchens, several of which have survived (Room Alpha 1, Room Delta 1a, Pillar Shafts 1B and 65B). They are equipped with fixed hearths and grinding tools, as well as varying numbers of clay pots for cooking, processing, storage and serving (Figure 7.17) (Birtacha et al. 2008). Plant remains and animal bones found in the kitchen of Pillar Shaft 65B support the more general view of subsistence at Akrotiri: inhabitants consumed predominantly domesticated species, such as sheep, goat, pig and cattle, which were supplemented with fish, molluscs and plants. The presence of large cooking trays indicates that meat was often consumed in a communal setting. Sea bream and sand smelts were the most commonly consumed fish and indicate a preference for catching easily available inshore fish; the presence of a tuna specimen, the first at Akrotiri, also indicates familiarity with catching migratory deep sea fish. Olive wood and stones and animal dung were used as fuels, while phrygana bushes, maquis, weeds and fruit were fodder for stabled animals. Finally, the lack of gnawed bones as well as the thorough burning of all food remains indicates the great care that was taken to keep kitchen and storage rooms clean and clear of rodents (Birtacha et al. 2008).

Figure 7.17 ‘Kitchen’ in Room Delta 1a: hearth with traces of burning, 3 large ceramic storage and processing vessels, a clay bathtub, stone vessel for grinding and 150 pots (Birtacha et al. 2008: Fig. 35.3). Image courtesy of the Akrotiri Excavation Archive.

Textile working

No actual textiles have been recovered at Akrotiri. However, large quantities of discoid loomweights have been uncovered at select locations and are mentioned on a Linear A tablet and thus attest to the importance of weaving as a specialised craft activity. Four hundred and fifty loomweights alone come from the West House (Room 3) and 200 from Complex Alpha. An analysis of the loomweights shows that they differ greatly in weight which, in turn, indicates that they were used for different types of weaves and materials. The raw materials used were probably wool, flax and silk. As wall paintings show, sailing boats required sturdy sails and clothes could be woven in beautiful patterns using a range of colours. The presence of crushed shells – murex shells contain a small sack of red dye that was commonly used for textile colouring – as floor packing hints at their widespread use in the settlement. Based on the uneven distribution of production units across town – only four out of eleven excavated buildings show evidence of textile production – and the different loomweight categories, scholars believe that Akrotiri was home to several specialist textile production units that produced different grades and types

of cloths for local use and export (Tzachili 1990, 2007). Related crafts are basketry and mat-making, both of which are attested at the site: mat impressions are common on the base of pottery vessels during the Early and Middle Cycladic periods, remains of mats have been found in Sector Delta and the West House, and disintegrated baskets made of rush or wicker have, among other locations, been recovered from basements in the West House and Sector Delta (Doumas 1983: 11).

Pottery

Clay vessels have been recovered in large quantities during the excavations and constitute the most abundant artefact category. The vast amount of pottery was produced locally and can be subdivided into storage containers for liquids and solids, transport vessels and pots for food preparation, cooking and serving. More specialist functions include "bath-tubs, braziers, oil-lamps, cult vessels, bee-hives, flower pots" (Doumas 1983: 108). In total, at least 50 different shapes can be distinguished (Figure 7.18). Aside

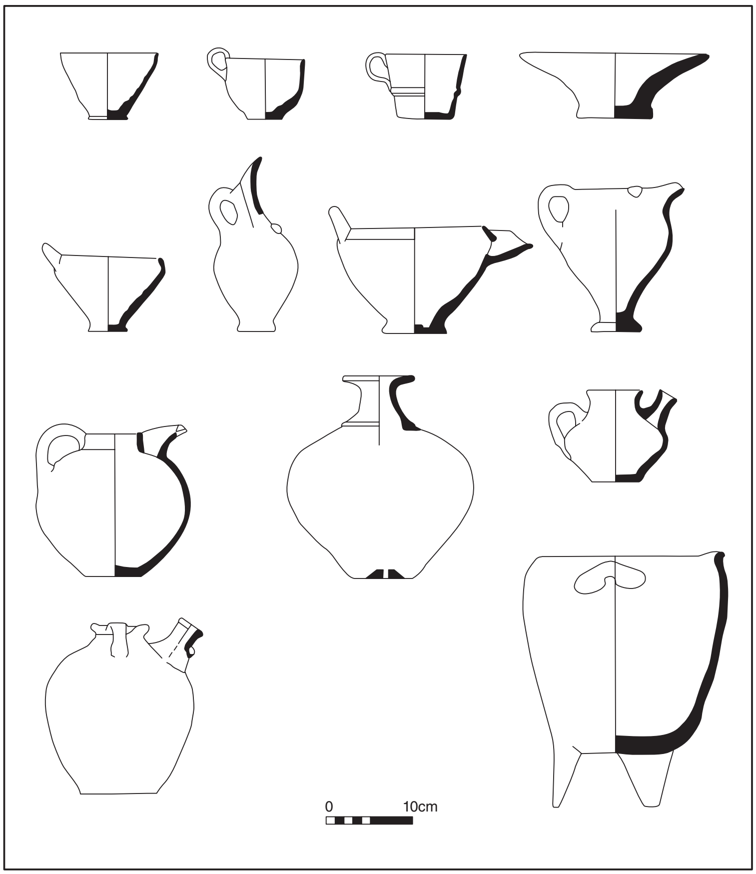


Figure 7.18 Common pottery shapes at Late Cycladic Akrotiri (after Doumas 1983: Figs. 14–15).

from plain, undecorated vessels, scholars distinguish between three wares: self slipped with monochrome, or more rarely bichrome, decoration; dark burnished/dark painted; and white burnished/white painted with dark decoration (Marthari 1990). The most common type of decoration is black, brown and red paint. Two decorative schemes exist: one follows the local Cycladic tradition, the other imitates Minoan designs. The latter conceptualises the pot as being divided into horizontal zones, each with its own motif or combination of motifs. Minoan motifs are predominantly of geometric design, such as bands, tortoise shell ripple, spirals, and concentric circles. The former views the entire pot as a single, unified surface where motifs are placed freely without restrictions. Motifs are frequently naturalistic and include flora (reeds, grasses, lilies, crocuses, myrtle) as well as fauna (fish, birds, goats) (Doumas 1983: 112). Unfortunately, no pottery workshop or kiln has as yet been discovered in Akrotiri or elsewhere on Thera, though the sophistication of the production makes it likely that potters were craft specialists. This view is supported by a thorough analysis of size (volume) categories for transport containers. Katsa-Tomara (1990) was able to demonstrate that potters produced oval-mouthed amphorae, open-mouthed jugs and bridge-spouted jars in standardised volume measures, ranging from miniature to large-scale examples with various gradations in-between. For example, bridge-spouted jars fall into five capacity groups with the smaller sizes representing 1/20, 1/6, 1/3 and 1/2 of the largest volume size. This kind of production indicates a highly organised industry that helped facilitate trade in desirable raw materials.

A considerable amount of pottery from Crete (most likely central and eastern Crete), the Greek mainland, the Cyclades and Dodecanese reached the site during the LC I period (e.g. Kilikoglou et al. 1990; Knappett et al. 2011). For the West House, Marthari (1990b: 61) has estimated that approximately 10% of all pottery was imported. Minoan pots make up the largest proportion among imported vessels. Common shapes include both open and closed vessel types: the semi-globular cup, askos, bridge-spouted jug, bridge-spouted jar, whole-mouthed jug, piriform jar, and rhyton. Less common are "the alabastron, the feeding bottle, the cut-away neck jug, the oval-mouthed amphora and the stirrup jar" (Marthari 1990b: 61). Imports from the mainland are present in relatively lesser quantities and predominantly consist of fine, lustrous-decorated Late Helladic I Vapheio cups. Other pot types, such as rounded cups, as well as Matt-Painted and polychrome containers, such as amphoras, hydrias, and kraters, are relatively rare (Lolos 1990; Marthari 1990a, 1993). Imports from other Cycladic islands (Melos, Naxos, Kea) are a regular occurrence, though precise provenancing is often difficult. Light-on-Dark and Dark-on-Light ware vessels (e.g. amphorae, jugs) also point to regular connections with the Dodecanese and Asia Minor (Marthari 1990b; Marthari et al. 1990).

Stone

A large number of stone objects have been recovered from the excavations. The presence of unworked stones, half-finished vessels, and wasters from production make it clear that stone was worked on-site, even though no clear stone workshop has as yet been identified. Finished objects include tools, vases and small finds, such as obsidian blades and seals. Most of them were made of local volcanic stone that was available in abundance. Common tool types comprise "grinders, pestles, polishers, hammers, anvils, millstones, [. . .] large hammerstones, and anchors" and pay testimony to the various craft industries that

were practiced at Akrotiri (Doumas 1983: 114). Of these tool types, portable and non-portable grinders constitute the largest category with 318 specimens. With 104 examples, mortars add up to the second most common category, while oil-lamps (21) are less common (Devetzi 1990). In addition to tools, local craftspeople also produced a wide range of stone vases from local and imported stones (Warren 1979). Imported stone vases from Crete, Cyclades, Syro-Palestine and possibly Egypt are fewer in numbers, although they utilised an impressive range of raw materials: "alabaster, gypsum, limestone, marble, *rosso antico* and serpentine" (Doumas 1983: 114).

In contrast to use of local volcanic stone for larger stone objects, the chipped stone industry relies almost exclusively on obsidian imported from the island of Melos. Moundrea-Agrapioti's study of chipped stone tools reveals that the obsidian was likely procured as raw material and processed at Akrotiri by people with no specialist training or knowledge. The tools created were for general, rather than specialised usages (1990).

Metallurgy

Metal objects are rare at Akrotiri. The few examples that exist are made of bronze and include "fish-hooks, knives, daggers, chisels, sickles and awls" as well as bronze vessels (Doumas 1983: 115). Lead was almost exclusively used for balance weights that have been found in considerable numbers at the site. A small cross is the only other lead object found in the excavations. Virtually no gold (a fragment of thin gold leaf and an ibex figurine) or silver (small rings) objects have come to light, although litharge from silver production hints at some on-site processing of this metal (Stos-Gale and Gale 1990). Isotope analysis of 45 objects shows that all lead derived from Lavrion. While Lavrion was also the predominant source of copper (7 samples), the presence of considerable numbers of Cypriote (5 samples) and Kythnian (3 samples) copper speaks to the international contacts Akrotiri had (Gale and Stos-Gale 2008). The puzzling scarcity of metal objects at the site is probably best explained with their removal by inhabitants as they evacuated the settlement ahead of the volcanic eruption (Doumas 1983: 114–116).

Woodworking

Wooden furniture rarely survives. However, thanks to the volcanic ash, wooden objects were enveloped in their entirety and, after they had disintegrated, could be reconstituted by pouring liquid plaster into the hollow cavities. These casts revealed the existence of wooden beds, tables, chairs, stools, and one tripod table with delicately carved decoration (Doumas 1983: 116–117).

Writing and administration

Fourteen objects inscribed with Linear A symbols have come to light at Akrotiri and one at nearby Potamos. They include inscriptions on clay vessels, ostraka and tablet fragments (Figure 7.19). With the

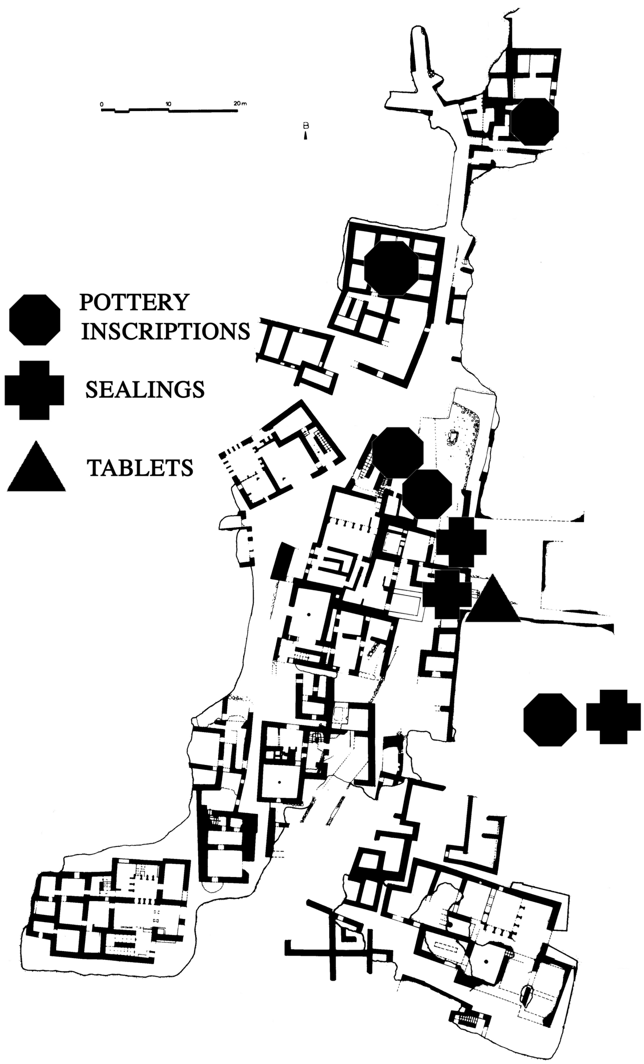


Figure 7.19 Findspots of Linear A inscribed and stamped objects (Karnava 2008: Fig. 36.4). With permission from A. Karnava.

exception of one Cretan pithos, all other objects were made locally. Inscriptions on vessels were made either before or after firing (Karnava 2008). Where logograms can be 'read' on the ostrakon, tablet and pithoi, they attest the presence of sheep, oil, wine and textiles (Boulotis 1998; Bennett and Owens 1999; Owens 1997). In addition to the preceding objects, 11 seals have been unearthed from Akrotiri and, while most come from the final volcanic destruction layer, three can be dated to the Early and Middle Cycladic period. Visual inspection indicates that two seals appear to have been made of local stone while the remainder were imported from Crete. The recent discovery is a locally made pithos with a Linear A inscription and 13 scorpion seal impressions along its rim from a trench south of Xeste 2, also

dated to the final destruction layer. The presence of the 'wine' logogram makes it likely that the pithos contained this substance (Karnava and Nikolakopoulou 2005). A hoard of over 60 seal impressions from Rooms Delta 18a and 18b provides evidence of the practice of record-keeping at Akrotiri. At its most basic, the evidence suggests the presence of some persons capable of reading and writing Linear A signs in the context of trade and craft production (Michailidou 2000–2001) – what is commonly called 'functional literacy', that is, an ability to read and write a limited set of words, letters and numbers where this concerns a specific task or profession. Although other scholars are more hesitant, Karnava (2008; also Palaima 1982) is confident that we can infer the existence of an administrative system akin to that from Minoan Crete at Akrotiri. If correct, this system would have recorded (and may also have overseen) production and distribution of specific products or produce.

The previously mentioned discoid lead weights fall into different size (and hence weight) categories and are commonly interpreted as having been part of an Aegean-wide metric system that helped facilitate trade and exchange (see Chapter 6). The collection of 26 lead weights from Room 6 on the upper floor of the West House is testimony to the presence of entire weight sets. Found together, the 26 weights could be used to measure almost all fractions and multiples of the basic unit. The presence of a textile workshop in the same building signposts an obvious use for the weights (Michailidou 1990).

Wall paintings

Akrotiri is best known for its unique collection of colourful and vibrant wall paintings. The proliferation of frescoes across the site beautifully illustrates the town's wealth, accumulated through sea trade with nearby and distant places. While the wall-painting technique itself mirrors that known from Crete, scholars stress the Cycladic characteristics of the frescoes' iconography, repertoire and programme (Morgan 1990; Davis 1990; Televantou 2000). The first step in creating a wall painting was to prepare the wall surface with a thin coat of fine lime plaster which then acted as the painting canvas. Initially, sketches were painted, impressed or incised into the plaster and acted as a rough guide for the painter. Although scholars call it the *fresco* ("fresh") technique, ancient painters did not always ensure that the plaster surface was wet when the pigment was applied and the preservation of the final painting is therefore variable. The artists generally used mineral paints to create a limited colour palette that ranged from white (lime) to yellow (haematitie, goethite, limonite), red (ferrous earths, haematite), black (probably carbon) and blue (Egyptian blue, amphiboles). Mixing of colours added grey, brown and pink to the colour repertoire (Perdikatsis et al. 2000). Surprisingly, green did not exist on Thera even though it was in use on Crete and the Greek mainland. Following general convention, women were portrayed with white skin and men with red skin. Blue signifies water and yellow architectural structures; yellow was also used to cover monochrome walls of bathrooms or lavatories. Any colour could be used to draw ornaments, picture borders and motif details. Painters were experts in their craft and easily adjusted compositions and motifs to the space available, from a small-sized miniature frieze to large wall sections. Generally speaking, walls were divided into three horizontal registers: the main composition was located in the middle register, its base in the lower section and decorative friezes covered the top.

An analysis of painters' styles, techniques and motor skills indicates that several individuals were involved in the creation of this art. Drawing on the realisation that, in some instances, more than one painter contributed to a composition, scholars have hypothesised the existence of artist schools. In cases where apparent errors were corrected in a different hand, a master-apprentice relationship has been proposed (Doumas 1983: 56, 73–74, 1992a: 16–20).

Compositions are often developed over more than one wall and some encompass an entire room. Subjects are wide-ranging and include abstract as well as naturalistic compositions. Abstract designs include, for example, bands for a border, secondary motifs within a pictorial composition, friezes of running spirals, individual rosettes and imitation marble. Theran wall paintings are famed for the artists' ability to depict nature as truthfully as possible, and scholars have often been able to identify particular plant species, animal genera and landscape features (e.g. Economidis 2000). Naturalistic motifs encompass 1) objects, 2) flora, 3) fauna and 4) humans. They can occur in isolation or as part of a landscape. Scholars have designated 'objects' as ships, buildings and towns. Floral motifs are normally incorporated into larger landscape settings. When found in isolation, they embellish less important wall sections (e.g. sacral ivy frieze, flower pots, papyrus). Animals and humans are most commonly part of a narrative, be it the two 'Boxing Boys' who are exchanging punches, the 'Spring Fresco' in which swallows can be seen flying through a flowering, mountainous landscape or the 'Flotilla' fresco which depicts the departure and arrival of a fleet of ships. Interestingly, domesticated cattle, sheep and goat are relatively rare while wild animals (e.g. lions, deer, wild cat, antelope, monkey, swallow, dove, duck, fish and dolphin) are frequently depicted (Doumas 1983: 74–77, 1992a: 20–26).

A comprehensive overview of the most important frescoes is provided by Doumas (1992a). Here I will focus on those wall paintings most commonly discussed in the literature: the West House, Sector Beta and Xeste 3.

West House frescoes

In Room 5 of the West House the famous 'Fishermen', 'Priestess' and 'Miniature Frieze' wall paintings were found. Room 5 has pier-and-window or door arrangements on all four sides that break up the composition (for a 3D reconstruction check out www.diorama.com/2016/12/06/kaspersky-lab-helps-santorini-excavation-akrotiri-thira/[last accessed 8/12/18]). The lower zone is covered by an imitation marble design in-between painted extensions of the window frames. The "Fishermen" and the "Priestess" are located in the middle register, while the Miniature Frieze is painted above the openings. The 'Fisherman' on the north wall is well preserved (Figure 7.20). The fresco depicts a nude young man holding a catch of fish in each hand. The fish have been identified as dolphinfish and small tunnies (Economidis 2000, Mylona 2000). His chest is shown frontally, his abdomen in three-quarter pose, head and lower limps are in profile. The painter has drawn two hair locks on his shaven head, indicated in blue. The second "Fisherman" on the west wall is less well preserved, but resembles the first in looks. The main difference lies in his posture. His entire body is depicted in profile and he appears to be offering three bunches of fish. The young 'Priestess' is dressed in a colourful garment (Figure 7.21). Like the

Figure 7.20 'Fisherman' fresco on the north wall of Room 5, West House (Doumas 1992b: Fig. 19). Image courtesy of Thera Foundation-Petros M. Nomikos.

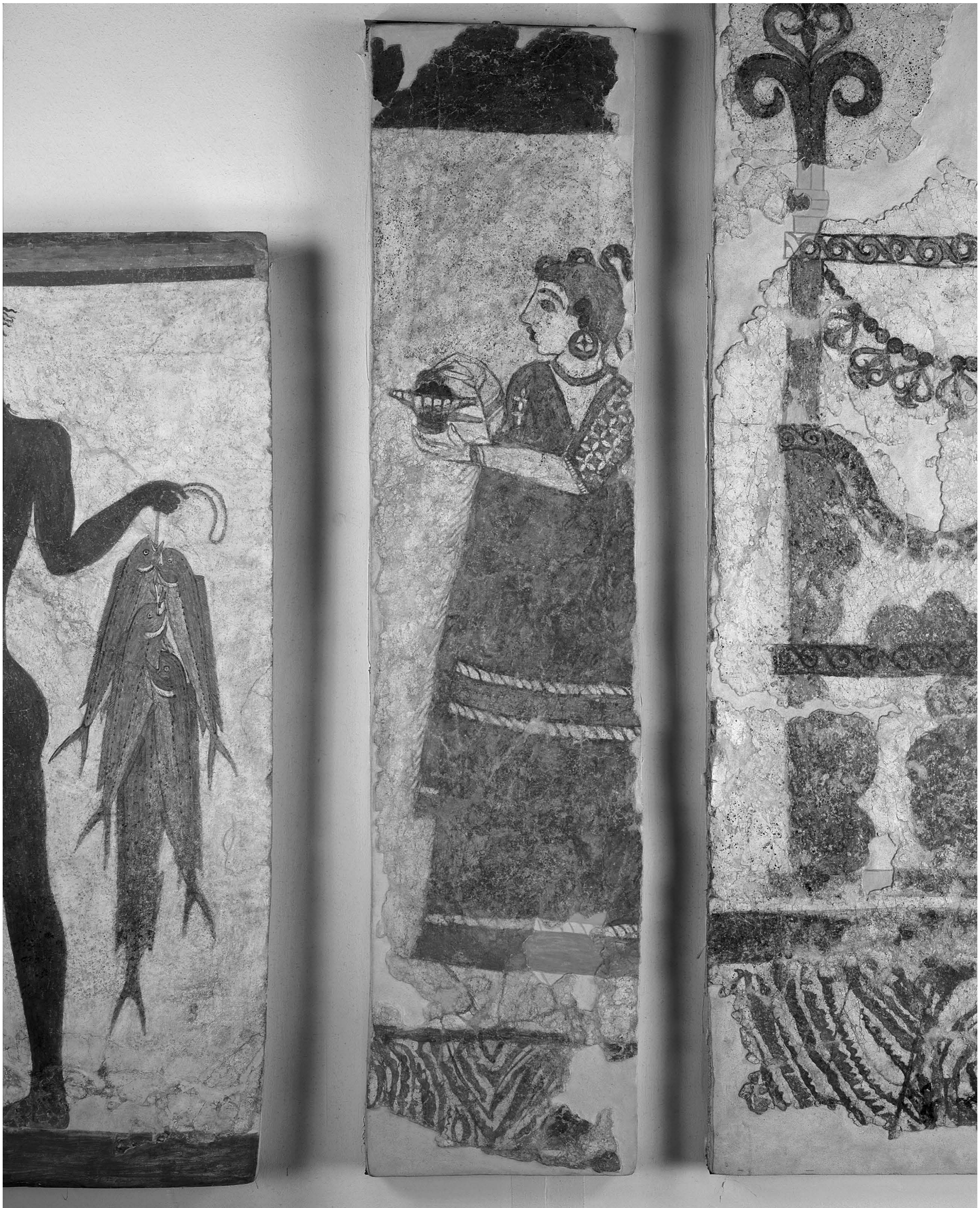


Figure 7.21 'Priestess' fresco, Room 5, West House (Doumas 1992b: Fig. 24). Image courtesy of Thera Foundation-Petros M. Nomikos.

'Fishermen', her head is shaven. She wears eye-catching jewellery in the form of an earring, necklace and bracelet. In her left hand she holds an incense burner on which she sprinkles a yellow substance (Doumas 1992a: 46–47). Following Doumas' interpretation that the fishermen participated in a rite of passage ceremony, Mylona has interpreted the catch of fish either as representing offerings to a deity or bounty of a ritual fishing competition or a symbolic representation of the sea more generally (2000). A thematic connection is therefore created between the fishermen and the young priestess who also appears to undergo a rite of passage in which a substance is ritually burnt (Papageorgiou 2000).

The Miniature Frieze is one of the most important pieces of art that has survived from the Bronze Age. It covered all four walls of Room 5 and originally stretched across 16 m of wall, although only 7.5 m survive (Morgan 1988; Televantou 1990). It tells the story of a sea voyage and several towns the travellers encountered on their journey. The frieze starts in the southwest corner with the depiction of Town I ('Departure Town') which Doumas (1992a: 47) identifies with Akrotiri itself. Departing from their home town, the travellers set sail and reach a coastal town (Town II) that is under siege. A battle is in progress and has already claimed its first victims: shipwrecks and drowned corpses are floating in the sea. Aegean warriors equipped with typical boar's tusk helmets, rectangular shields, long spear and sword are marching on the fortified town. In contrast, life in the hinterland of the town is peaceful. Herders are driving their cattle, sheep and goats into a shady pen while women are filling their pots with water at a well. Town III appears to be located where a river meets the sea. The river is set in a lush, exotic landscape where wild ducks, wild cats, jackals and a mythical griffin live among palm trees. This river landscape acts as an interlude in the narrative and Town IV, also a coastal town located in a river delta, likely represents the same town as Town III. This section, the so-called Flotilla (Figure 7.22), shows a fleet of seven large boats departing from Town IV for Town V, presumably their home port. All ships are equipped with paddles or oars, but three boats already have their masts raised. The ships are relatively crowded with seated warriors, up to 20 oarsmen and a helmsman. The captain of each vessel, identified by his long spear and

Figure 7.22 Miniature Frieze section 'Flotilla, Town IV', Room 5, West House (Doumas 1992b: Fig. 35). Image courtesy of Thera Foundation-Petros M. Nomikos.

boar's tusk helmet, sits inside a cabin. Town V ("Arrival Town"), with its harbour, multi-storied buildings and surrounding landscape, has been argued to represent Akrotiri where the inhabitants eagerly welcome the returning fleet (Doumas 1992a: 47–49; Morgan 1988; Televantou 1990).

Interpretations of this sea voyage are manifold and some scholars have gone as far as proclaiming the frieze to depict actual historic events. The events surrounding Town IV, in particular, have given rise to a wide range of suggestions: we may be witnessing a sacred regatta in memory of ancient traditions, a nautical festival, or even a wedding procession. Whatever the nature of the frieze, archaeologists believe that its maritime theme is related to the house owner's profession – most likely a sailor or merchant, as indicated by the many lead weights, who had experience in travelling to distant regions (Doumas 1992a: 49; Morgan 1988: 165).

Sector Beta frescoes

Two rather playful fresco themes were revealed in Room Beta 1. The north wall depicts the so-called Boxing Boys, while the other walls are covered by frescoes of antelopes – either in pairs or single. In the former fresco, two nude boys are engaged in a boxing fight (Figure 7.23). Both have partially shaven heads with strands of hair hanging over their backs and locks over their foreheads. Both wore boxing gloves, loincloths and jewellery. Antelopes are depicted on the remaining three walls. The best preserved picture on the west wall shows two animals painted in outline with their heads turned towards each other (Doumas 1992a: 109–110). Scholars have drawn attention to the thematic symmetry of the compositions that favour pairs of protagonists who are competing with each other. Given that the boys are portrayed as children, we may again witness a moment or event in a rite of passage (Marinatos 1984: 106–112). Both themes are also united artistically by an attempt to create depth visually through layering of the arms (boxing boys) or bodies (antelopes).

Xeste 3 frescoes

An impressive building for public use, Xeste 3 has revealed wall paintings in many rooms. The best known are in Room 3 on the ground floor and on the first floor. The presence of a lustral basin in Room 3a (ground floor) has given rise to the interpretation of the associated frescoes as depicting separate initiation rituals for men and women: the three females ('Adorants') painted on the north wall are making their way towards a monumental shrine topped by a pair of horns of consecration with streaks of red – interpreted either as blood drops or saffron stigmas – located on the east wall. The three women wear colourful garments, ornate jewellery and elaborate hair styles. Each woman is depicted in a different pose: the first proffers a rock crystal bead necklace, the middle figure is seated on a rock holding her injured left foot in pain – the blood mirroring the blood on the horns of consecration. The easternmost woman, her shaven head covered with a veil, is moving towards the injured woman while looking backwards towards the shrine. In contrast to Room 3a that is dedicated to female imagery,

Figure 7.23 'Boxing boys' fresco from Room 1, Beta-South (Doumas 1992b: Fig. 79). Image courtesy of Thera Foundation-Petros M. Nomikos.

the adjacent room 3b shows four male figures involved in a ritual ('Naked Boys'). Three nude male figures who carry a large one-handled bowl, striped cloth, and small bowl respectively are advancing towards a seated adult man dressed in a white loincloth who is about to empty the content of his hydria (Figure 7.24). The three nude males represent three different phases of maturity as can be seen by their

Figure 7.24 ‘Naked Boys’ fresco from Room 3b, Xeste 3 (Doumas 1992b: Fig. 109). Image courtesy of Thera Foundation-Petros M. Nomikos.

heads and hair: the youngest boy shows a shaven head with a single hair lock, the adolescent has a shaven head with several longer hair locks, the oldest of the boys displays almost fully grown hair and the seated adult man has fully grown hair. Scholars have interpreted these scenes as depicting an initiation rite into puberty – womanhood and manhood respectively (Doumas 1992a: 128–130; Marinatos 1984: 61–84).

Room 3 on the upper floor also hosts several important wall paintings whose iconographic programme is devoted to women and nature, and is thus thought to be associated with the paintings in Room 3a on the ground floor. The fresco on the east wall depicts two women gathering crocus flowers in a mountainous landscape (‘Saffron Gatherers’). The theme continues on the north wall where a third female figure carries a basket full of crocuses while a fourth is emptying her crocus harvest into a basket that is placed in front of the large central figure, a rather majestic looking woman who is seated on a tripartite structure flanked by a blue monkey on the left and a griffin on the right (‘Mistress of Animals’). The monkey is climbing up the steps of the structure to offer the woman a bouquet of crocuses. The griffin, tethered by a rope, is also climbing towards the seated woman. All women are wearing colourful garments and beautiful jewellery. Different maturity stages are visible in the variation of the hair styles.

Figure 7.25 "Saffron Gatherers and 'Mistress of Animals'" fresco from Room 3, Xeste 3 (Doumas 1992b: Fig. 122). Image courtesy of Thera Foundation-Petros M. Nomikos.

There is little doubt that we are witnessing an important ritual ceremony in which women gather crocuses and offer them to a deity who is seated on a monumental tripartite throne (Figure 7.25). A marshy landscape with reeds, dragonflies and ducks on the west wall completes the theme. The strong association with nature generally as well as the exotic blue monkey and the mythical griffin, have led scholars to argue that the central figure represents the 'Mistress of Animals', *Potnia Theron*, who is depicted in an idealised environment "in the midst of terrestrial, aerial and imaginary creatures, and adored in a symbolic milieu of serenity, where Nature is pictured at the peak of its fertility" (Vlachopoulos 2008b: 453; Doumas 1992a: 130–131). Considering the Xeste 3 iconographic programme as a whole, the evidence suggests that the building was dedicated to the depiction (and presumably actual performance) of gender-specific initiation rites in the context of seasonal renewal of nature (Vlachopoulos 2008b; Marinatos 1984: 61–84).

CONTEXTUALISATION: THE ROLE OF AKROTIRI IN THE AEGEAN AND THE EFFECTS OF THE VOLCANIC ERUPTION ON TRADE AND INTERACTION

Archaeological finds, frescoes and the location of the island of Thera itself all suggest that Akrotiri had wide-ranging contacts with the outside world. Its considerable wealth, as evidenced by its large and multi-storey houses and the quality and abundance of its wall paintings, means that its inhabitants probably played an important role in Aegean seafaring and overseas trade. Although the inhabitants had time to remove precious objects from their houses prior to the final eruption, imported clay vessels from Crete, the Greek mainland, other Cycladic islands and the Dodecanese provide good indicators as to the town's contacts; so does the import of raw materials, such as obsidian (Melos), gypsum (Syro-Palestine), ostrich eggs (Egypt) and metals (Lavrion, Cyprus and Kythnos).

Direct evidence of trade and seafaring unfortunately eludes us. However, the use of Linear A and the largest collection of metal balance weights found in the Aegean provide circumstantial evidence of these activities. The depiction of boats and sailing voyages in the wall paintings, as well as the long and well documented history of Cycladic seafaring and trading make it likely that Therans were highly competent seafarers. Whether these sailors were engaged in local, regional and/or international exchange is a matter of speculation as evidence is entirely lacking. However, it seems extremely likely at the very least that skilled local artisans produced products also for export, such as textiles, stone vases, pottery, perfumed oils, saffron and wine, or offered their services abroad as painters, masons or metal workers (Schofield 1990; Forsyth 1997: 91). Based on the strategic location of Thera as the first stopover point for sailors travelling north from Crete and as a nodal point between east and west and north and south, Akrotiri "must have been one of the busiest [harbours] in the Aegean regional network" which must have facilitated the adoption of Linear A and the weight system, and goes a long way to explain its wealth (Forsyth 1995: 95).

Akrotiri's connections with Crete were particularly strong – an island which exerted major artistic and technological influence on many Aegean regions, but whose impact was particularly pronounced at Akrotiri. Its influence can be seen most prominently in the wall painting (*fresco* technique), pottery production (potter's wheel) and vessel shapes (local imitations of many Minoan shapes), building technique (ashlar masonry, mason marks, timber frames) and architectural features (polythyra, central room columns, lustral basin), as well as religious beliefs (horns of consecration) and practices (lustral basin) (Palyvou 2005: 180–187; Doumas 1983). To some scholars, the religious iconography, beliefs and practices appeared so similar that they felt compelled to argue for a Minoan-Cycladic syncretism (Marinatos 1990: 375). Despite well documented Cretan influence, scholars are careful to emphasise Akrotiri's strong Cycladic tradition and intrinsically indigenous nature (Doumas 1983: 122–125).

The importance of Akrotiri as a trading hub is best explored through the flow of objects and raw materials within and without the Aegean before and after the volcanic eruption. Two approaches have been put forward: the 'diversity index' and 'network modelling'. The first approach utilises the concept of the 'diversity index' (Berg 2007a). At the heart of this approach lies the realisation that different types of imports are procured through different exchange networks, and the greater the diversity of materials, the more diverse trading contacts a settlement had. It should be noted that quantities of artefact groups

are not taken into account to avoid a bias towards well-published/well-excavated sites and materials are recorded as absent or present only.

During the Middle Bronze Age, this approach shows that Crete is the best connected region in the Aegean. The limited evidence available from Middle Cycladic Akrotiri indicates that the settlement was at least as well connected as other Cycladic towns as it received pottery from Crete, the Greek mainland and its Cycladic neighbours. No evidence exists as yet of connections beyond this core region. By Late Cycladic I, the situation had changed dramatically. There is now comprehensive evidence that Akrotiri was the best connected trading hub in the Cyclades as imported pottery, stone, metal and precious stones from Crete, the Greek mainland, Cyclades, Dodecanese, Cyprus and Syro-Palestine testify. Unique among its Cycladic counterparts, Akrotiri is able to tap into eastern trade networks to attract gypsum vases from Syro-Palestine and Cypriot metal (Berg 2007a).

Following the catastrophic eruption that led to the destruction of Akrotiri as an exchange hub, trade networks had to adjust and did so quickly and efficiently. Increased diversity indexes at Ayia Irini on Kea and Kastri on Kythera indicate that these two sites appear to have taken on part of Akrotiri's role in the LM IB period, although the quantities of exotica present at each site are few. In the meantime, the mainland is beginning to exercise greater cultural influence and its pottery exports eventually surpass Minoan imports at Cycladic sites.

The second approach is based on mathematical network modelling that uses site carrying capacity, links and distance as variables to determine the most 'efficient' networks (Knappett et al. 2011). Although utilising an entirely different set of variables, conclusions from both approaches are complementary. During the LM IA period, contacts within regions are vibrant, although connections between different network zones are rather weaker and, where more intense, are often governed by interests of one major political unit. Following the Theran eruption, the model shows an instant re-organisation of the trade network with Phylakopi on Melos taking over as a replacement in the immediate aftermath. There is no indication that the total volume of trade changed as a consequence of the loss of Thera. During LM IB, Kastri on Kythera and Ayia Irini on Kea flourish as they become more preferential trading partners while, at the same time, trade networks emanating from the mainland are gaining in importance. Over time, the model predicts that fewer and fewer sites are participating in inter-regional networks, thus creating the potential for a collapse of one or more nodes and, in its extreme manifestation, leading to the collapse of Minoan society.

Despite Akrotiri's importance and wealth as a trading hub with wide-ranging connections during its existence, life went on in the Aegean after its demise. Exchange networks re-oriented themselves, new trading centres emerged, new participants entered and old ones dropped out. Nevertheless, the archaeological and artistic legacy that Akrotiri, the 'Pompeii of the Aegean', leaves behind secures it a special place in the Greek Bronze Age.

8

THE THERAN VOLCANIC ERUPTION

The Late Cycladic I eruption of Thera is one of the most important natural events in the Greek Bronze Age. It not only preserved the remains of the town of Akrotiri and its inhabitants' belongings beautifully (see Chapter 7), but it is also the focal point of two major scientific debates, namely around the size and date of the eruption. This chapter will explore the geology first before turning its attention to chronology. The contextualisation section investigates to what extent (if any) the eruption could be considered the cause for the decline of the Minoan civilisation on Crete.

THE GEOLOGY OF THERA

Thera is one of the volcanic centres that stretch out along the South Aegean Volcanic Arc, a zone of high seismic activity between Aegina in the West and Nisyros in the East owing to the subduction of the African plate underneath the Aegean plate (see Figure 2.3). Thera (modern-day Santorini) is probably the best scientifically researched region of the volcanic arc. In fact, Thera is not a single island, but rather a group of islands (Thera, Therasia, Aspronisi, Palaea Kameni, and Nea Kameni) which enclose a sea-flooded caldera. Together, these islands formed 12 eruptive centres which became active around 1 million years ago. However, their greatest phase of activity can be dated to the last 200,000 years. It is clear from Thera's geology that the island was not formed by one single event but experienced many formation phases (Friedrich 2000). At its core is the ancient, non-volcanic metamorphic rock of the Profitis Elias massif that had formed during the Pliocene. Since then, volcanic events have laid down material and reshaped the island. The oldest volcanic rock is located on the Akrotiri peninsula, the youngest at Palaea and Nea Kameni islands which formed in historic times. Five major eruption events can be recognised in the island's history and a caldera was formed and filled in again at least four times (Druitt et al. 1999; Friedrich 2000: 31). As a consequence, the island was reshaped continuously (Figure 8.1).

Major eruption event	Years ago
Lower Pumice 1 eruption	203,000 ± 24,000
Lower Pumice 2 eruption	180,000
Middle Pumice eruption	56,000 ± 3,000
Cape Riva eruption	18,000
Minoan eruption	1600–1627 BC

Figure 8.1 Thera eruption history.

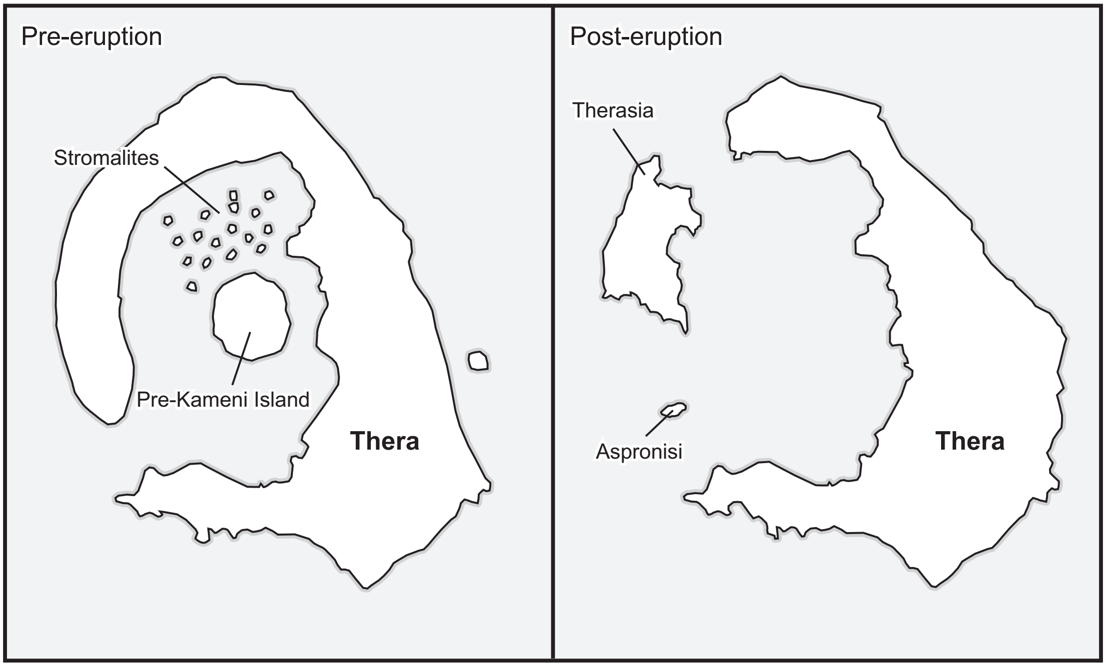


Figure 8.2 Thera before and after the eruption (after Friedrich 2000: Fig. 11.4).

The eruption that concerns us in this chapter is the so-called Minoan eruption which took place in the Late Minoan IA/Late Cycladic I period and whose precise date has been a matter of – sometimes rather heated – debate for decades. Following the Late Bronze Age eruption, the island was fragmented resulting in the formation of Thera, Therasia and Aspronisi around the ancient caldera (Figure 8.2).

After the Bronze Age eruption, the volcano appears to have been dormant until 197 BC when Strabo reports on the volcanic eruption that created Palaea Kameni (*Geography* 1.3.16). Subsequent eruptions gave rise to the islet of Theia in AD 46, and another island in AD 726; this island later became united with Palaea Kameni. The island of Mikra Kameni was formed around AD 1570. An eruption took place in AD 1650 which caused a large number of human and animal casualties from gas inhalation, and a tsunami damaged structures along the eastern coast of the island (Dominey-Howe et al. 2000). Volcanic activity between 1707 and 1711 created the island of Nea Kameni which was later united with

Mikra Kameni. Further eruptions are recorded from 1866–1870, 1925–1926, 1928, 1939–1941 and 1950 which caused islets to appear, submerge and reappear (Friedrich 2000: 163–180). Frequent seismic activity continues to the present day; approximately 1,000 earthquakes, mainly of low magnitude, have been recorded between 1994 and 2002 alone (Dimitriadis et al. 2005).

This long-term volcanic activity has resulted in dozens of strata: the uppermost stratum is constituted of pumice and ash and belongs to the Late Bronze Age eruption; it is 60 m in depth. The next 21 underlying strata are 35 m thick and consist of ash, cinders, scoriae, pumice, lapilli, blocks and lahar deposits. Below these is the 4-m-thick pumice layer that belongs to the Middle Pumice Series, dated to ca. 56,000 years ago. Further lava strata are underneath (Doumas 1983).

THE ERUPTION SEQUENCE AND THE SIZE OF THE ERUPTION

The so-called Minoan eruption in the LM IA period was the largest eruption of the last 10,000 years. It buried the entire island under a 60-m-thick layer of ash, and also impacted dramatically on life on neighbouring islands and regions. In magnitude, the Theran eruption has been compared to those of Tambora and Krakatau in Indonesia in 1815 and 1883 respectively, which caused loss of life in the thousands either directly as an effect of the eruption or indirectly through tsunamis or subsequent famine (Symons 1888). The Volcanic Explosivity Index (VEI) lists both the Theran and Krakatauan eruptions as 6, the AD 79 eruption of Mt Vesuvius in Italy is classified as 5, while Tambora has one of the highest scores with 7 (Simkin and Siebert 1994; www.volcano.si.edu/ accessed 4/2/15). However, recent work by McCoy and others suggests that previous estimates did not take into account the volume of ash and lava that had vanished into the caldera and been deposited on the ocean floor around the island, thus underestimating the size of the eruption by 100%. A VEI of > 7 (that is, at least 10x more explosive than VEI 6) is now proposed for Thera, making it the largest known eruption globally of the late Holocene (McCoy 2009: 84; Sigurdsson et al. 2006; Johnston et al. 2014).

The islanders had warning of the impending eruption in the form of an earthquake. Broken staircases and collapsed house walls were uncovered at the site of Akrotiri (see Chapter 7) and highlight the destructive force of this earthquake. Collections of building debris from damaged buildings, repairs to buildings and the use of demolition tools testify to the reoccupation and repair of the city by the original inhabitants. It is also an indicator that the earthquake was not immediately succeeded by the eruption, but that some time – perhaps weeks or even months – had passed (Doumas 1983: 134–135). However, this period of regeneration did not persist for long and the inhabitants soon deserted the settlement for good (Figure 8.3). The relative lack of valuables and the complete absence of skeletal remains indicate that the inhabitants had prior warning. Unfortunately, it is impossible to confirm whether the islanders managed to leave the island safely or whether they were surprised by the eruption on the coast as they were trying to escape by boat (Friedrich 2000: 67–71).

It has been estimated that the eruption took place over four days. The opening phase of the eruption began with a small explosion that laid down a thin layer of fine ash particles. This event may have been the final warning that led to the ultimate evacuation of Akrotiri. The first phase was the

Event	**Akrotiri and Thera**
Earthquake	Broken staircases, collapsed house walls
Post-earthquake	Repair of damaged houses and reoccupation
Eruption: opening phase	Desertion of town prior to eruption or during opening phase Thin layer of ash
Eruption Phase 1: Plinian phase	Thick 1 m layer of ash across island. Lava rocks catapulted from caldera
Eruption Phase 2: Base surge	Hot lava flow deposits of up to 7 m. Lava boulders catapulted from caldera
Eruption Phase 3: Pyroclastic flow	Hot gas and ash flows of up to 50 m. Lava boulders catapulted from caldera
Eruption Phase 4?	
Post-eruption	By end of eruption sequence, the island was covered in 60 m of ash

Figure 8.3 Sequence of earthquake and eruption activity and their effects on Akrotiri and Thera.

so-called Plinian phase during which a large eruption column pushed pumiceous material into the air to a height of 36–38 km. Tephra entered both the troposphere and stratosphere resulting in ash dispersal at both the lower and higher levels of the atmosphere. During this phase, which probably lasted no more than a few hours, an estimated 1.4 cu km of ash was deposited on the island. With the wind blowing from west to east, the layer was thickest in Fira (7 m) and thinnest around the Cape Akrotiri (20 cm thick). Sporadically, large pieces of lava were torn from the caldera walls and catapulted out. Pumice that fell into the sea was carried by the sea current to distant places, such as Crete, Cyprus, the Levantine coast and even Egypt. Fine ash was blown southeast by the wind as far as the Black Sea and Egypt. Deposits have been uncovered in the Dodecanese and western Anatolia (Friedrich 2000: 72–73). Ash was also picked up by the jet stream in the stratosphere and circulated towards the east and northeast. Assuming that the modern wind pattern mirrors that of the Bronze Age, the eruption probably occurred during late spring or early summer (McCoy 2009: 80–82). The volcano itself was located on the Pre-Kameni island (Friedrich 2000: 72–73).

The second eruption phase is called the base surge. It appears that the vent had broken down, allowing sea water to enter. The interaction of sea water and fluid magma resulted in violent clouds of ash and steam that surged down the slopes of the volcano at an estimated speed of up to 200 km per hour. In total, ca. 2 cu km of pumice were deposited in this second phase, leaving behind a 7-m-thick deposit that consisted of multiple surge flows (Friedrich 2000: 73–75). The surges became increasingly hotter, reaching up to 300°C in the final stages (McCoy 2009: 82). As in the Plinian phase, large lava boulders were ejected from the caldera wall. Several of these blocks reached Akrotiri 10 km away where they demolished houses.

During the third eruption phase, the vent of the Pre-Kameni volcano widened further, throwing out large lava blocks mixed with pumice and sea water. Instead of propelling material primarily upwards, pyroclastic flows of ash and hot gas streamed down the slopes of the volcano. The deposit had now reached a thickness of 55 m. The rapid emptying of the magma chamber in this phase resulted in the collapse of much of the volcano. The present caldera with its large northern basin and the deepened southern section are the outcome of this third phase (Friedrich 2000: 75–76).

Scholars debate whether volcanic deposits that lie above those of the pyroclastic flow indicate a fourth eruption phase or represent reworked material. Considering that this layer is found only along the lower rim of the caldera, consists primarily of lithic pieces and the underlying layer is partially eroded, Friedrich (2000: 77) believes that it is unlikely to be an eruption deposit. In contrast, McCoy draws attention to additional surge deposits of several metres of thickness that he believes resemble the fourth eruption phase (2009: 83–84). By the end of the entire eruption, an ash layer 60 m in depth covered the entire island and changed the shape of Thera from a ring-shaped island to its current squat shape. The Pre-Kameni island, having been the location of the volcano, vanished in its entirety, leaving a 500 m deep basin in its place (Friedrich 2000: 77–78).

ENVIRONMENTAL EFFECTS OF THE THERAN ERUPTION: LOCAL

While the base surge and pyroclastic flow did not reach the highest parts of the island, the 1 m thick pumice layer of the first eruption phase covered the entire island, including Profitis Elias, its highest mountain. Thus, the devastation of the island was complete. Select plants and animals (e.g. snails, lizards, snakes and insects) may only have survived at the highest elevations where the ash layer was thinnest. As no human skeletons have come to light at the excavations at Akrotiri, it is possible that the inhabitants heeded the warning of the pre-eruption earthquake and the very first explosive event and managed to leave the island by boat. However, it is also possible that they were surprised by the eruption while arranging their departure from the island – only future excavations along the shore will give us a clearer picture of the ultimate fate of the inhabitants (Friedrich 2000: 77–78).

ENVIRONMENTAL EFFECTS OF THE THERAN ERUPTION: REGIONAL

Ash

Ash layers of the Theran eruption have been recognised in many excavations on Greek islands, eastern Crete and in western Turkey (Figure 8.4). Their distribution indicates that the prevailing wind direction at the time of the eruption was southeasterly. Ash layers vary in thickness: on Rhodes they have been found to be up to 10 cm thick and on Kos 10–30 cm. On Melos, only traces of ash have been found. At Mochlos, Pseira and Palaikastro on Crete, ash thicknesses varied from negligible to 15 cm from the central to the eastern part of the island (McCoy and Heiken 2000: Fig. 11; McCoy 2009: Fig. 6).

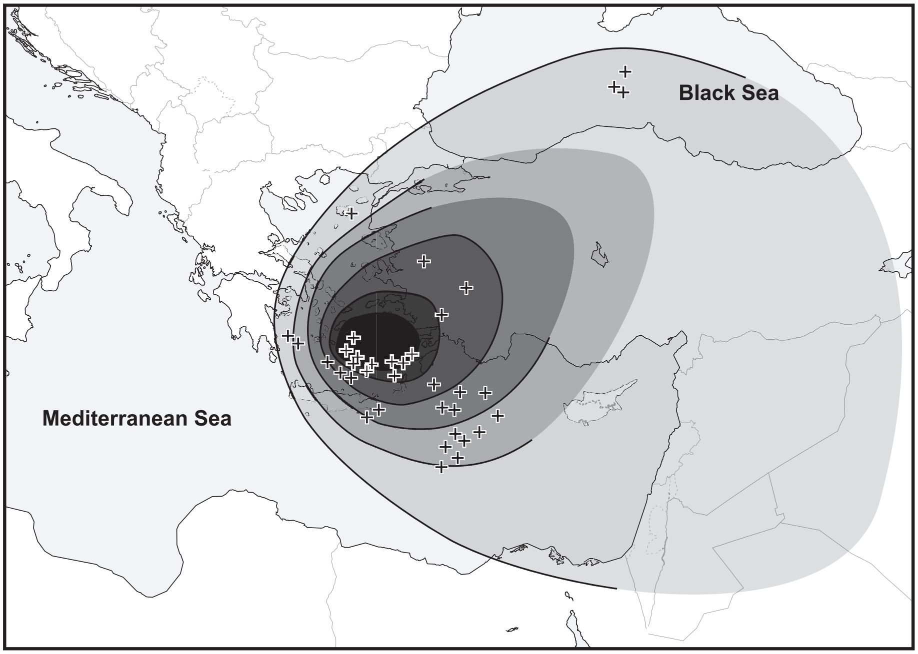


Figure 8.4 Thickness of Theran ash dispersal in the Eastern Mediterranean (after McCoy 2009: Fig. 6).

Such depths of ash would have caused some stress to plants and animals until the ash had been eroded or washed away by rains. Depending on the exact point within the agricultural cycle, the ash layer must have interfered to some degree with agriculture and may have contributed to a poorer harvest for that year. In a worst-case scenario, it may have resulted in the destruction of the entire harvest. It may also have damaged insects and burrowing animals. Inadvertent ingestion of ash by sheep, goat and cattle may have resulted in intestinal upset, possibly reducing the life expectancy of grazing livestock. Human health could have been impacted by the inhalation of ash particles, potentially leading to lung disease (McCoy 2009: 84–85; Oppenheimer 2013: 54).

Pumice

Vast rafts of floating pumice must have covered the surface of the sea and drifted around the Eastern Mediterranean with the current, making boat voyages more hazardous. Pumice rafts from the 1883 Krakatau eruption, for example, were as large as 20 km in diameter and 3 m thick (McCoy 2009: 85). Pumice pieces have been discovered along many coastlines, ranging from the Cyclades, Crete and Cyprus to the Levantine coast (Francaviglia 1990; Stanley and Sheng 1986) (Figure 8.5). Scholars have used pumice evidence to establish the date of the Theran eruption. However, not all pumice pieces that have been scientifically analysed for their trace elements can be linked to this Theran eruption; some are

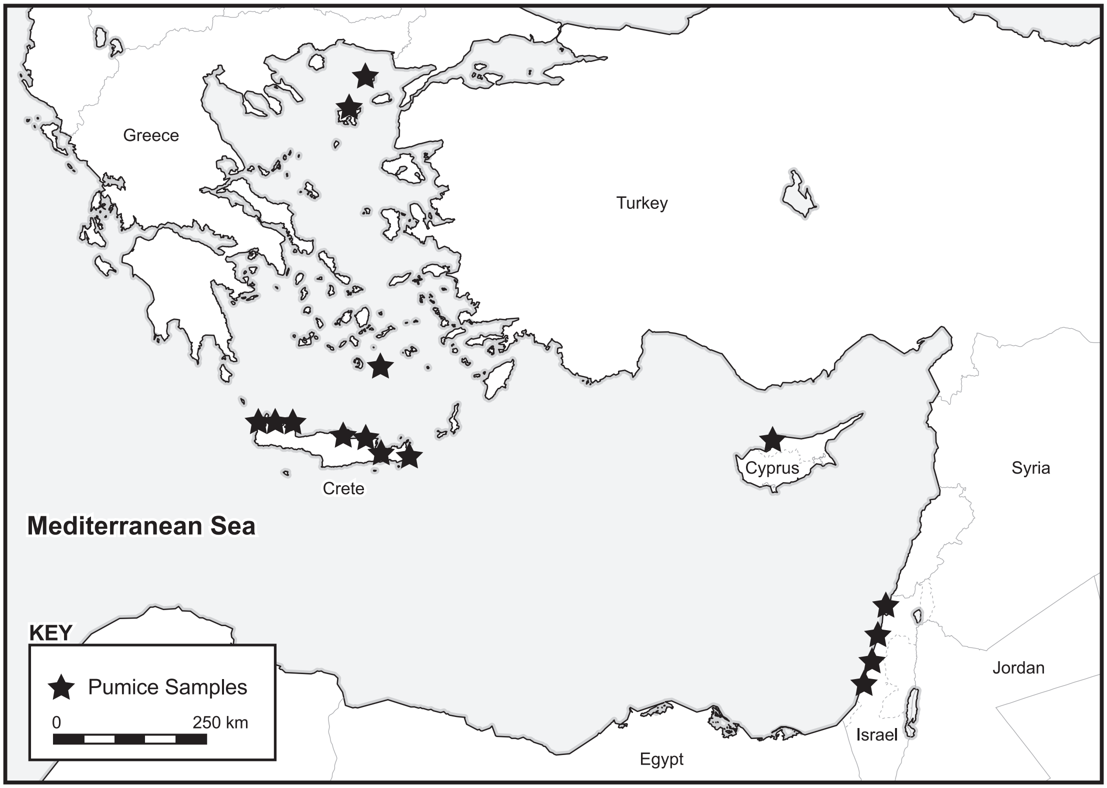


Figure 8.5 Pumice remains from the Late Bronze Age Theran eruption found across the Eastern Mediterranean (after Francaviglia 1990: Fig. 2).

from earlier Theran eruptions, some stem from a different volcanic island altogether. Those that have been shown to belong to the Theran eruption merely confirm a date of the eruption before Late Minoan IB (Francaviglia 1990; Warren and Puchelt 1990; Sterba et al. 2009). More problematic is the use of pumice to determine the height of the presumed tsunami. This argument is based on the assumption that pumice floated on top of the tidal wave and was deposited inland at the height at which the tsunami hit the shore. However, Dominey-Howe (2002: 214) argues that the large waves formed by tsunamis do not propel floating material forward as crested breaking waves do. Given the short duration of the eruption, it is equally unlikely that the pumice sheet had sufficient time to float long distances to be uplifted by the tidal wave and be deposited upon the shore. McCoy and Heiken (2000: 1248), for example, estimate that it would take between 85 and 350 days for pumice floats to reach the Levantine coast. The most convincing evidence of Theran pumice deposition can be found at a potter's workshop at Gouves in central Crete where a 10–20 cm thick pumice layer was found immediately above a stratum of marine sand. The site is located between 30 and 90 m from the shore and lies 2–3 m above current sea level (Minoura et al. 2000).

Tsunami

Tsunamis, large tidal waves, can be created by a variety of mechanisms. They include submarine slides, shallow earthquakes, caldera collapse and meteorites (Cita et al. 1996: 168–170). The Theran eruption, scholars have speculated, could have caused tsunamis when the caldera collapsed and/or when the pyroclastic flows entered the sea (Cita et al. 1996: 169; McCoy and Heiken 2000). Evidence of such a tsunami can be identified in 54 seabed cores which all contain a layer of 'homogenite', characteristic fine structureless mud, which varies in thickness from 1 m to 10 m depending on the morphology of the seabed. Radiocarbon dating indicates a date of 3,300 +/– 200 years BP for the layer immediately below the homogenite (Cita et al. 1996; Cita and Rimoldi 1997).

Once created, the tsunami rapidly travelled across the Eastern Mediterranean. The most recent calculations show that waves reached the coast of Crete within 30 minutes and the Levantine coast within one and a half hours. The height of the tsunami wave when it hit the shores remains contentious. Based on pumice finds on neighbouring Anaphe at an elevation of 40 m, Yokoyama (1978) proposed a height of 50–86 m near Thera, reducing to 7 m wave height at Tel Aviv. Unfortunately, the Anaphe pumice layer was later found to belong to an earlier Theran eruption and is therefore irrelevant for the Late Cycladic eruption (Francaviglia 1990). Instead, tsunami deposits on Thera itself indicate a wave height of between 7 and 12 m, comparable to the 8–10 m height range proposed for Crete's northern coast (Bruins et al. 2008; McCoy and Heiken 2000; Minoura et al. 2000). Archaeological evidence, such as the seawater and pumice layers at Gouves, is in line with the lower height averages.

With settlements and palaces located close to the northern shoreline, it can be presumed that the tsunami would have caused widespread devastation, considerable loss of life and destruction of boats. Where rivers intersect the coast, the tsunami would have travelled inland, causing further devastation to people and structures along the river. Recent simulations suggest a maximum inundation of the Cretan shoreline of between 250 and 450 m (Novikova et al. 2011: 673). Archaeological or geological evidence of the tsunami reaching Crete has been relatively elusive. In 2008, however, Bruins and colleagues were able to confirm the existence of tsunami deposits at the settlement of Palaikastro, Crete, dating to the LM IA period (also Bruins et al. 2009). The link between the deposits and the Theran eruption is assured by the presence of airborne Theran volcanic ash (deposited in Phase 1 of the eruption and subsequently swept up with the tsunami) in all of the 'chaotic' Palaikastro deposits, Minoan pottery dated to the LM IA period and radiocarbon-dated animal bones whose dates agree with the date of the Theran eruption. Based on the investigated findspots, it can be concluded that the tsunami travelled at least as far as 300 m inland at Palaikastro.

ENVIRONMENTAL EFFECTS OF THE THERAN ERUPTION: WORLDWIDE

'Volcanic winter'

The impact of large explosive volcanic eruptions, such as those of Tambora, Krakatau and Thera, can go far beyond the actual region and effect temperatures and weather globally (Self 2006). This is

because they propel ash particles and gases (mainly sulphur) upwards into the stratosphere in the Plinian eruption cloud. The ash and gases are picked up by the jet stream and circulated around one or both hemispheres – depending on the location of the volcano (Self 2006). In the case of Thera we know that the jet stream transported the material towards the east and northeast. The consequences of this ash and gas accumulation in the stratosphere can be marked. They include cooler annual average temperatures for one or more years following the eruption as the particles block incoming solar radiation (the so-called volcanic winter) and changes to rainfall patterns with an increased risk of flooding (Pyle 1997). The injection of sulphur into the stratosphere can also lead to the depletion of the ozone layer, allowing more UV-B rays to reach the earth. For example, the gases released by the relatively small-scale Pinatubo eruption of AD 1991 had spread around the globe within three weeks and influenced the earth's climate for more than three years; global temperatures were 0.5°C below normal even two years after the eruption (Self 2006). The Tambora eruption, Indonesia, of AD 1815 released six times more sulphur into the stratosphere. This resulted in a global cooling of 1°C for the year 1816 and ensuing unpredictable weather, crop failures and mass starvation. The year became known as the 'year without a summer' (Oppenheimer 2003). No direct evidence exists for the global effects of the Theran eruption, although a temperature decrease of 0.5°C has been calculated based on total erupted mass and sulphur yield (Sigurdsson et al. 1990). Indirect evidence for a worsening climate is provided by tree-ring measurements from Irish oak and North American bristlecone that show narrow annual growth bands during the approximate timeframe of the Theran eruption. However, we must exercise caution until causation between these two occurrences has been demonstrated (Salzer and Hughes 2007).

DATING THE THERAN ERUPTION

Since the 1970s, a great many articles, chapters and books have been written and several congresses have been held in order to determine the absolute dating of the Theran eruption (and to a much lesser extent the relative chronology). At the very heart of this debate lies disagreement between conventional typological and scientific dating methods. Conventional methods have used imported objects to establish synchronisms with other – better dated – regions arriving at a date of ca. 1,500–1,520 BC for the 'Minoan' eruption. In contrast, radiocarbon evidence indicates a date sometime between 1,650 and 1,600 BC. These two chronologies are termed the 'low chronology'/'conventional chronology' and the 'high chronology' respectively (Figure 8.6). It is probably fair to say that this difference of about 100 years has generated the largest discussion of any topic in Aegean prehistory. For the time being, the two main camps remain firmly entrenched in their respective positions.

One of the reasons why the dating of the eruption is crucial is the recognition that much of our dating relies on synchronisms with other regions and cultures by virtue of objects and stylistic features that were imported or transferred between regions. Scholars have used interrelations between Cypriot, Levantine, Egyptian, Italian, northern European and Aegean artefacts to help date objects and events across the Eastern Mediterranean. An absolute date for the Theran eruption would, therefore, provide

'High' chronology	**'Low'/conventional chronology**
Based on radiocarbon dating	Based on cross-dating with Egyptian periods through traded objects
Theran eruption dated 1,600–1,650 BC	Theran eruption dated 1,500–1,520 BC
Implications for:	
• Egyptian chronology • Contemporaneity between Cretan and Egyptian phases • Length of cultural sequences in Greece	

Figure 8.6 The 'low' and 'high' chronology.

a firm date anchor for contexts and objects not only within the Aegean, but for regions far beyond the Aegean itself.

Relative dating

The relative dating of the Theran eruption is generally agreed among scholars to fall into the mature-late LM IA phase. Artefacts uncovered from the site of Akrotiri date the event stylistically, while Minoan and Helladic imports provide good comparanda to dated contexts on Crete and the Greek mainland. Tephra layers found at different archaeological sites (e.g. Melos, Rhodes, Crete) and deep-sea cores also provide a dating frame for the eruption event. Since initial investigations on Thera in the 19th century, a date of the eruption contemporary with the LM I period on Crete had been accepted. It was only with the recognition that the Cretan LM I period could be subdivided into two chronologically distinct phases, LM IA and LM IB, that a more precise date could be assigned. No stratigraphic information existed at the time, thus the two phases could only be distinguished by pottery styles. LM IA used abstract or floral designs as well as spirals and bands. In contrast, LM IB was characterised by marine imagery and unified thematic representations (Marinatos 1939). Drawing on Egyptian chronology, Furumark (1941) dated LM IA to 1,550–1,500 BC and LM IB to 1,500–1,450 BC. No LM IB-style pottery had been uncovered from Thera; thus the eruption had to fall within the LM IA period. From that time onwards, the conventional date for the Theran eruption was put at ca. 1,500 BC. Excavations began at Akrotiri in 1967 and confirmed that the site was destroyed in LC I, equivalent to LM IA. This is particularly well demonstrated by the stratigraphy from the West House, which revealed a deposit of over 1,000 vases from the Volcanic Destruction Level, including a substantial number of Minoan and Helladic imports. Comparing these imports with finds from Cretan and mainland sites provides a date in the mature stage of the LM IA and LH I respectively. The underlying stratum shows evidence of a seismic destruction and subsequent rebuilding and is dated to the early LM IA. Pottery from the lowest stratum dates to the late Middle Cycladic period (Marthari 1990b). The occurrence of motifs, such as the double axe, that later become part of the LM IB repertoire hint at a timing of the eruption in the mature-late phase of LM IA. No LM IB objects have as yet come to light and it is now generally accepted that the Theran eruption dates to the mature-late LM IA period (Figure 8.7).

<table>
<tr><th>Stratigraphic level</th><th>Architectural features</th><th>Cretan comparanda</th><th>Mainland comparanda</th></tr>
<tr><td rowspan="3">SEISMIC DESTRUCTION

EARTH QUAKES

VOLCANIC DESTRUCTION</td><td>New buildings</td><td>MM IIIB–
early LM IA</td><td>Late MH</td></tr>
<tr><td>Reconstruction of buildings</td><td rowspan="2">Mature LM IA</td><td rowspan="2">LH I</td></tr>
<tr><td>Incomplete repairs</td></tr>
</table>

Figure 8.7 Stratigraphic chronology of the West House, Akrotiri, Thera (after Marthari 1990b: Table 1).

Archaeological synchronisms

The conventional low chronology is based on a variety of objects and stylistic features that establish synchronisms between Egypt, the Levant and Crete during the Middle and Late Minoan periods. These dates are about 100–150 years lower than radiocarbon-based dates and place the Theran eruption around 1,500–1,520 BC (e.g. Warren and Hankey 1987, Warren 2009; Wiener 2009a). As stylistic features cannot be dated precisely, they should not be regarded as reliable date indicators. This includes the current heated debate around the fresco finds from Tell el-Dab^{c}a, the ancient capital of Avaris, which mirror Cretan-style frescoes in style, technique and motives and, to a lesser extent, those from Tel Kabri and Alalakh in the Levant (Bietak 1995; Niemeier 1991). Preference should instead be given to imported artefacts, such as Minoan objects in Egypt or the Levant and Egyptian or Syro-Palestinian objects in Crete that have been uncovered from stratified contexts.

The following artefacts feature prominently in this debate:

1. An alabaster lid from Knossos that is inscribed with the name of the Hyksos king Khyan
2. Three Egyptian stone vessels from Mycenae and Akrotiri
3. A Late Cypriote IA White Slip I bowl from Akrotiri
4. A decorated LM IB sherd found in Tomb 328 at Abydos, Egypt
5. Fragments of nine Middle Bronze Age II Syro-Palestinian gypsum vessels found at Akrotiri
6. An LM IB or LH IIA style alabastron from Tomb 245 at Gurob, Egypt
7. A LH IIA pithoid jar found in Tomb 20 at Thebes, Egypt
8. A fragmentary LM IB spouted jar from Taanach, Palestine
9. A LH IIA alabastron and a late LH IIA/B cup from Saqqara Teti Pyramid tomb NE 1
10. A squat LH IIB jar from the tomb of Maket at Kahun, Egypt
11. A scarab dated to the reign of Amenophis III from a tomb at Sellopoulo, Crete

As is apparent, the synchronisation is based on a small number of objects only; none of these are dated to the LM IA period and only a few to LM IB/LH IIA. More importantly, Höflmayer (2011) has shown that their stratigraphy is less secure than once acknowledged and that alternative dating ranges can

be proposed for the finds from Abydos, Gurob, Saqqara and Kahun. Additional uncertainties revolve around the dating of Khyan's reign, the Egyptian chronology more generally and Tell el-Dab^ca's stratigraphy (Manning et al. 2014; Ritner and Moeller 2014). From an Aegean perspective, scholars have questioned the stratigraphy of the Khyan lid and the dating of the Egyptian stone vessels and White Slip I ware (Manning 2014: 35–37; Höflmayer 2012). At the moment, these objects offer *termini ante quem* or *post quem*, but we are unfortunately missing incontrovertible and securely stratified evidence to support specific chronological cross-dating (Manning et al. 2014).

Dendrochronology

While dendrochronological data have been much discussed in the literature, their contribution to the dating of the Theran eruption remains uncertain.

As sulphur and ash were propelled into the stratosphere during the Plinian eruption phase, these particles were picked up by the jet stream and distributed around the northern hemisphere. Scholars have argued that the global repercussions of the Theran eruption can be detected in climatic cooling and increased rainfall resulting in narrower annual growth rings of trees. As dendrochronology relies on differences in annual growth rings, it should be possible to date the Theran eruption precisely. Three different case studies have reached prominence in this debate: Irish bog oak, Californian bristlecone pine and Anatolian archaeological timber. Irish oak trees from four different bogs show a consistent and widespread 'narrow growth event' indicative of the worst growing conditions recorded over their entire lifespan. This event has been calculated to fall into the 1,620s BC. A comparable narrowing of growth rings for the same time interval has also been observed in England and Germany (Baillie 1990; Baillie and Munro 1988). A similar argument has been put forward for frost rings observed in Californian bristlecone pines. Frost rings leave distinct anatomical fingerprints in the wood and occur when the spring growth is interrupted by a cold spell that pushes temperatures below freezing for several days. Such an event has been observed in 50% of all bristlecone pines in California and is contemporary with the approximate date of the Theran eruption (LaMarche and Hirschboeck 1984). More recently, Salzer and Hughes (2007) have demonstrated a close correlation (86%) between volcanic eruptions and reduced growth rings in American bristlecone pines and have pointed out that several rings within the 17th and 16th centuries BC are consistent with a large volcanic eruption. Similar growth anomalies have also been reported from Finland and Siberia (Hantemirov and Shiyatov 2002). Anatolian timber from archaeological contexts has been used to construct a continuous (but floating) 1,503-year tree-ring chronology. Thirty-six trees from the site of Porsuk show an "exceptional growth event" due to cool and wetter weather which can be dated to 1,628 BC. Researchers have emphasised the uniqueness of this event in the tree record and believe that it was caused by a major climatic anomaly – the Theran eruption being the most likely candidate (Kuniholm et al. 1996: 781). More recently, this event has been radiocarbon dated to 1,650 BC and chemical investigation has confirmed a volcanic origin for the growth anomaly (Manning et al. 2001; Pearson et al. 2009). From this overview we can conclude that several dendrochronologies hint at a major climatic event in the 17th century BC. However, they only

provide indirect evidence; it remains to be demonstrated that it was the eruption of Thera that caused the colder and wetter weather pattern.

More recently, scholars have turned to stalagmites in Turkish caves to understand whether the Minoan eruption could have left a discernible imprint on the various trace elements. They determined that Bromine, Molybdenum and Sulphur peaks were contemporary with (or just after) the eruption date (Badertscher et al. 2014). While indicative of a volcanic event, this research suffers from the same drawbacks as dendrochronological work in that it is impossible to link Thera specifically to these biomarkers.

Ice cores

For several decades, ice cores extracted from Greenland were believed to provide a firm date for the Theran eruption, but this certainty has been shaken by recent analyses, reassessments, claims and counter-claims.

Ice core dating is based on the recognition that snowfall is laid down annually in layers and builds up a chronological stratigraphy over time. The layers can be extracted through coring to provide a slice through time. As a consequence of the annual deposition, scholars should be able to gain detailed insights into the prevailing climatic and atmospheric conditions within each year, including the timing of volcanic eruptions. Sulphuric acid and ash that is propelled into the stratosphere by explosive volcanic events becomes embedded in the falling snow and is deposited with it; composition analysis of tephra particles should pinpoint the origin of the eruption. The most relevant ice cores for the Theran eruption are Dye 3, GRIP, North GRIP and GISP2 from Greenland. Of these, the first three are in close chronological agreement with each other while GISP2 diverges by about 30 years (Vinther et al. 2006). In 1987, Hammer and colleagues reported on the volcanic sulphuric acid signature in the Dye 3 deep core around 1,645–1,644 BC which they associated with the Theran eruption (see also Hammer and Clausen 1990). That this signature was caused by a volcanic eruption was beyond doubt; however, its origin was conjecture based on the large size and explosivity of the Theran eruption as well as contemporary tree growth ring anomalies that had previously been linked to Thera (see 'Dendrochronology' previously). Subsequent work by Hammer and colleagues (2003) revealed that the Dye 3 1,645 BC acid volcanic ice core signal is also visible in GRIP and North GRIP; given the hemispheric wind circulation pattern this eruption must have originated north of 30°N. The micro-tephra particles embedded in the snow were analysed and the trace elements show good correspondence between the ice core acid particles and Theran pumice composition. While a Theran origin is not certain, the authors believe that it is unlikely that another rhyolitic eruption was responsible. This claim was argued to be incorrect by Keenan (2003), who demonstrated that statistical errors were made during the analysis of the tephra composition. These errors were so grave that the postulated good correlation with Thera can no longer be maintained; new trace element analyses undertaken by Pearce and colleagues (2004) instead favour an Alaskan volcanic source.

Compositional analysis of tephra from the GISP2 ice core does not shed more light on the issue. According to Zielinski and Germani, a high sulphuric acid layer dated to 1,623 BC +/– 36 years is not a

match to Thera nor to any other known eruption of the 17th century BC (Zielinski and Germani 1998). However, as in the previous case, the veracity of Zielinski and Germani's analysis was questioned on account of the incompleteness of the core and calculation errors. As regards the former, some 87 m of GISP2 were "not suitable for analysis", introducing unknown dating errors (Manning 2014: 301). As a consequence, Hammer and his colleagues excluded the core from further analyses entirely and relied on GRIP data that are complete and extracted from the same local area (2003: 87). Despite these problems, Manning's reassessment of Zielinski and Germani's data shows that the standard error for their composition measurements does *not* exclude Thera as a possible origin for the ice core tephra particles (2014: 289–300).

Further written exchanges between the pro-Theran and anti-Theran camps have resulted in an impasse on this issue whereby neither a Theran nor an Alaskan source can be confidently assigned or excluded (Vinther et al. 2006; Denton and Pearce 2008; Vinther et al. 2008).

In 2013, Baillie (see also Muscheler 2009) offered a radical solution to the chronological and compositional problems of: 1) why dendrochronology/radiocarbon and ice core dating derived two different dates for the eruption (ca. 1,628 and ca. 1,645 BC respectively), 2) why GISP2's dating differed from those of Dye 3, GRIP and North GRIP, and 3) why Theran tephra had not yet been identified in ice core layers. Based on the knowledge that tree-ring data are fixed, Baillie believed that dendrochronology is likely to be more accurate than ice core data. Dendrochronology has the added advantage that every single year can be confidently recognised in growth rings and results have been replicated in different countries. Baillie therefore suggests that it is the ice core data that are out of sync. By moving Dye 3, GRIP and North GRIP dates by about 25–30 years forward, their signals would line up almost perfectly with major dendrochronological signals, including a date of ca. 1,628 BC for the Theran eruption. When correlating GISP2, which is offset by approximately 25–30 years, with the other ice cores, he demonstrated that this is actually the more accurately dated ice core. As scholars were looking at an older annual layer in the Dye 3, GRIP and North GRIP ice cores, they were consequently and unsurprisingly unable to find a Theran signature. The correctly dated GISP2 core did reveal tephra (Zielinski and Germani 1998) which Manning was able to show to be consistent with Thera. A search for tephra in Dye 3, GRIP and North GRIP layers covering the younger timeframe of 1,630–1,590 BC will shed light on the feasibility of Baillie's hypothesis. To add further confusion, the proposed dating of a major Anatolia tree-ring anomaly to 1,650 BC may, on the other hand, suggest that ice core dates are the more reliable date marker and that dendro-dates may have to be adjusted by about 25 years (Manning et al. 2001; Pearson et al. 2009).

Radiocarbon

Radiocarbon, or ^{14}C, dating refers to a scientific method of absolute dating (for a review of the technique, see Bronk Ramsey 2008). When cosmic rays interact with nitrogen in the atmosphere, they create radiocarbon. In turn, radiocarbon combines with oxygen and can then be absorbed by plants through photosynthesis. Animals that eat these plants also ingest radiocarbon. When the plant stops growing or

the animal dies, no further carbon can be absorbed and the existing radiocarbon decays at a constant and known rate. Thus, the date of death of a plant or animal can be calculated based upon our knowledge of the radiocarbon decay rate. The technique is well established and proven to be accurate, but it also presents some challenges as level of radiocarbon in the atmosphere changed through time resulting in past date ranges with greater and lesser variability in concentrations. As a consequence, dating may not always be as accurate as one would wish. In acknowledgement of these inherent difficulties, radiocarbon dates are recorded as a year with an error range (e.g. 1,550 BC +/- 35). For the most accurate age determination of an archaeological stratum or context, scientists prefer short-lived organic samples (such as seeds) rather than specimens with a long lifespan (such as timber) (Manning 1999: 232–233).

With regards to dating the Theran eruption, seeds from the Volcanic Destruction Level (VDL) should have provided an accurate date. In reality, however, the tabulated dates varied widely, though – broadly speaking – they favour a date in the 17th century compatible with the 'high' chronology (Manning 1990; Hubberten et al. 1990; Friedrich et al. 1990; Maniatis 2012; Nelson et al. 1990). When trying to understand this variation, scholars pointed to four potential methodological problems: 1) the dating of short-lived plant samples seems to give results that vary considerably around the date average; 2) some results appear to have been contaminated or processed incorrectly and show results outside the expected date range; 3) radiocarbon ratios were similar between the late 17th century and the middle of the 16th century BC – the period under investigation for the Theran eruption – making discrimination between these two date ranges more difficult; and 4) volcanoes emit carbon-dioxide which can impact on the radiocarbon levels near the crater and result in inaccurate measurements (Manning 1999: 233–236). Manning (1999) has discussed each of these problems in detail and has shown that none has a great impact on the reliability of the technique or undermines its resulting dates. At the heart of the variation in dates, it seems, lay the sample selection and preparation which did not target fully carbonised samples, but frequently used partly carbonised matter that may have leached carbon over time and partly dissolved in the sample pre-treatment (Friedrich et al. 1990). Among earlier samples collected, Manning (1999: 238) only considers the results from fully carbonised samples processed by the Copenhagen Laboratory as uncontaminated. These results, as well as more recent data, point to a date in the 17th century BC for the eruption (Manning 2014: Figs. RE1 and RE2; Maniatis 2012).

By analysing samples from Crete that belong to periods immediately prior to or after the eruption – effectively bracketing the eruption – scholars were hoping to approach the problem from a different angle. To provide a *terminus ante quem* for the Theran eruption, scientists collected samples from LM IB destructions at Myrtos-Pyrgos and Chania and LM II destructions of the Unexplored Mansion at Knossos. The radiocarbon results showed that the end of the LM IB period must be dated no later than ca. 1,525–1,490 BC (Housley et al. 1999). Samples from the MM III and early LM IA periods at Kommos on Crete provide a *terminus post quem* for the eruption and were radiocarbon dated to the 18th/17th centuries and 17th century BC respectively (Manning 1999: tables 9, 10). Dates from Kolonna on Aigina (Wild et al. 2010), Lerna in the Argolid, Miletus in Anatolia, Trianda on Rhodes and Palaikastro on Crete also support at 17th century BC date for the LM IA period (Manning 2014: 52–53).

In 2006, a paper published by Friedrich and colleagues promised to put an end to the debate surrounding the date of the Theran eruption. The authors reported the discovery of an intact olive

tree from Thera that had been buried alive in situ by volcanic tephra from the Bronze Age eruption. Several growth rings of a branch produced radiocarbon dates, and the outermost ring was dated to 1,627–1,600 BC (Figure 8.8) (further details provided in Heinemeier et al. 2009). A second tree nearby was excavated in 2007, but results have not yet been published (Friedrich and Heinemeier 2009). Discussion of the date quickly honed in on several crucial methodological questions: was the olive branch truly alive when buried? How accurately can olive tree rings be recognised? Is radiocarbon dating skewed by old CO_2 from the volcano? Is the utilised calibration curve/programme correct and reliable? Additional details provided by Friedrich and Heinemeier (2009), Heinemeier et al. (2009) and Bruins and van der Plicht (2014) demonstrate the reliability of each of the original assumptions and conclusions.

At the time of writing, all radiocarbon evidence points towards a date of the Theran eruption in the late 17th century BC, thus supporting the 'high' chronology (Figure 8.9). Ice core and dendrochronological evidence cannot be confidently linked to the Theran eruption and thus remains inconclusive. Unfortunately, initial variation in dates and disagreements between laboratories and debates over appropriate calibration curves puzzled archaeologists and implanted a degree of distrust into people's minds about

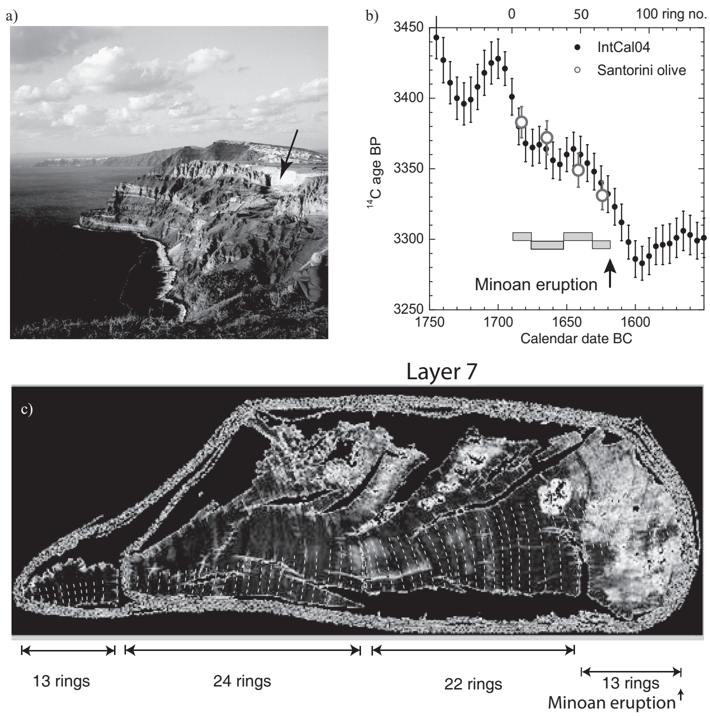


Figure 8.8 Olive tree covered by the Theran eruption. B) Radiocarbon dates. C) X-ray tomography of a section of the olive tree with markers indicating growth rings (Friedrich et al. 2006: Figs. 1b and c). Permission granted by Walter Friedrich.

Period	**Manning (2014)**	
	Start BC	End BC
LM IA	1,700–1,675	1,610–1,580
LM IB	1,610–1,580	1,500–1,450
LM II	1,470–1,450	1,440–1,410

Figure 8.9 Approximate Minoan radiocarbon chronology (after Manning 2014: p. 96, Table RE4).

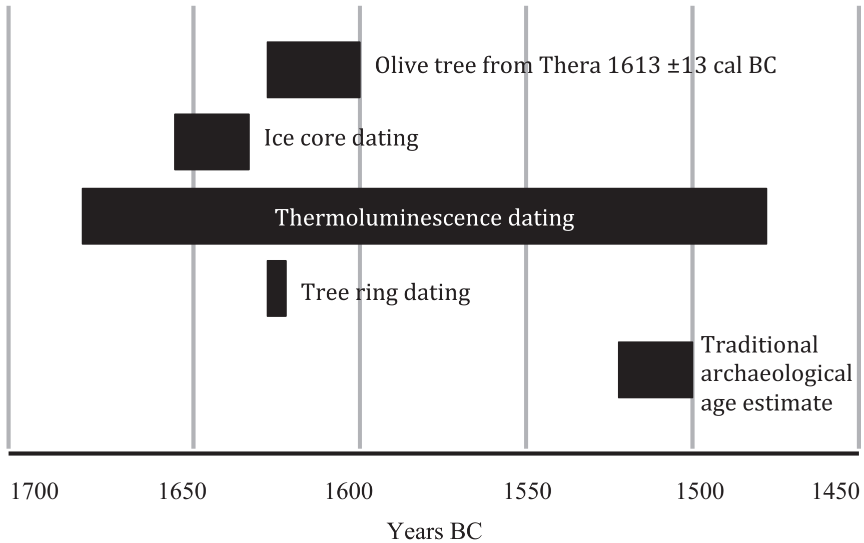


Figure 8.10 Comparison of archaeological and geochronological dating of the Theran eruption (after Heinemeier et al. 2009: Fig. 11).

the validity and accuracy of the radiocarbon technique (as well as ice core dating and dendrochronology) which is still evident in some sections of the archaeological community (e.g. Wiener 2009b, 2012; Warren 2009) (Figure 8.10).

CONTEXTUALISATION: THE EFFECTS OF THE THERAN ERUPTION ON MINOAN CRETE

Although it is now clear that the Theran eruption and the collapse of the Minoan civilisation took place in different time periods, LM IA and LM IB respectively, scholars originally believed the two events to be chronologically and causally linked. This view is most clearly expressed by Marinatos (1939). Drawing attention to the island-wide destructions and abandonments on Crete, he argued that these could not have been caused by invaders or minor earthquakes, but were a direct consequence of

the volcanic eruption of Thera (1939). He envisaged the Theran eruption to have had similar after-effects to the well-documented eruption of Krakatau on Indonesia on the 26th to 27th August 1883:

> A tremendous roar accompanied the explosion and was heard over 2000 miles away. [. . .] Such quantities of volcanic ash filled the air that, even at a distance of 100 miles, day was turned into dark night, and these ashes fell as much as 1000 miles away. Very fine particles of ash were thrown 30 miles up into the stratosphere, picked up by the air current and dispersed over the whole of the earth. This dust was suspended in the air for months and months. But worst of all was a series of terrific waves which rose after the explosion. They were as much as 90 feet high and broke with devastating force and speed against the coasts of Java and Sumatra. Where they struck a plain, they swept inland, and as far as 1000 yards inland they were still 15 yards high. Whole towns, villages and woods were destroyed and great masses of stones from the sea were hurled far inland. So, too, trains and ships. [. . .] This amazing catastrophe cost over 36,000 lives.
>
> (Marinatos 1939: 431–432)

Considering that Crete is only ca. 90 km (67 miles) distance from Thera, Marinatos believed that the consequences would have been at least as severe for the Minoans. He acknowledged that, due to the quickly rising contours of Crete, the tsunami would not have penetrated far enough inland to eradicate towns and cities. Instead, he envisaged that strong earthquakes destroyed inland settlements (1939). Even though this was a persuasive argument, the editors of the journal *Antiquity* noted that there was insufficient archaeological evidence to confirm Marinatos' hypothesis: "The Editors wish to point out that in their opinion the main thesis of this article requires additional support from excavation on selected sites" (Marinatos 1939: 439).

In 1967, Marinatos began the excavations of Akrotiri on Thera which allowed him to test his hypothesis (1968–1976). As a consequence of these excavations, it became apparent that the latest imported Minoan pottery belongs to the LM IA phase, a period preceding the Cretan LM IB destruction horizon. Since then incontrovertible scientific evidence has been published that demonstrates that the Theran eruption and LM IB destructions on Crete, regardless of whether one follows the high or low chronology, are separated by at least 100 years (Manning 2014). Nevertheless, the eruption is still most commonly referred to as the 'Minoan' eruption.

Even though the Theran eruption cannot be called upon as the direct cause for the demise of the Minoan civilisation, scholars have suggested that it might have contributed indirectly. In 1997, Driessen and MacDonald investigated this possibility systematically in their book '*The Troubled Island'* (also Driessen and Macdonald 2000). Their starting point was the large number of destructions and abandonments of Cretan settlements. Of the 54 LM IA sites, only 32 continued to exist into the LM IB period (Figure 8.11). At the same time, archaeologists observed a reduction of occupied space within existing settlements, and a decrease in or even absence of new building constructions. Old wells were abandoned and new wells dug. Driessen and Macdonald (1997) also observed an emergence of what they termed 'crisis architecture'. This includes the modification of entrance

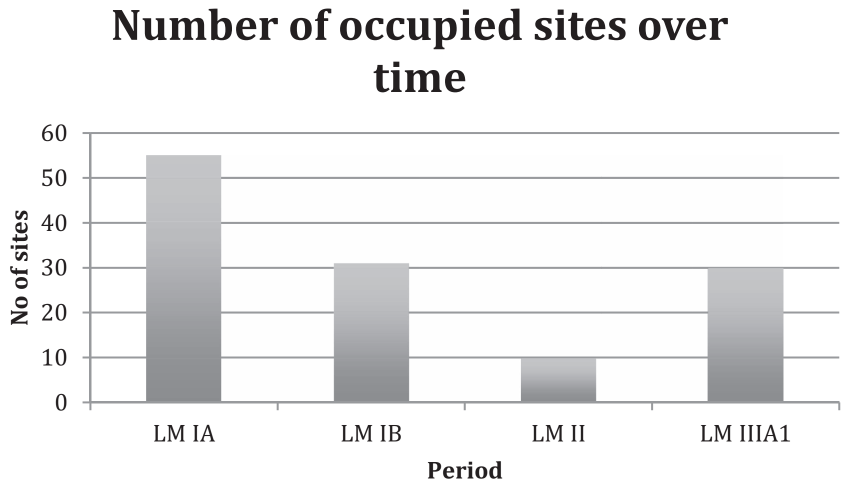


Figure 8.11 Cretan settlement pattern LM IA-LM IIIA1 (after Driessen and Macdonald 1997: Figs. 4.1 and 4.4).

systems to buildings and palaces with the purpose of restricting access, the erection of enclosure walls within towns and around buildings, the subdivision of buildings and changes in room function from residential/ritual to food production/storage/workshop. A decentralisation of food production, industrial production and storage is visible in the emergence of villas – a short-lived phenomenon of country houses with strong links to the palaces. The authors also observed changes in religious practices and sites, such as the marked reduction in peak sanctuaries. The sudden increase in metal hoards in palaces and houses indicates a time of great uncertainty and stress. Last but not least, the production of fine and valuable prestige objects was at its height in LM IA. Production of these objects continued into LM IB, but its organisation was no longer in the hands of independent local craft specialists. Rather it was increasingly brought under palatial control, as in the case of the LM IB Palace Style pottery style.

Taken together, all these changes indicate a time of considerable stress, a need for protection and a concern with basic survival among common people. Elites, on the other hand, were attempting to legitimise and solidify their position by bringing the production of prestige goods under their control and by associating themselves with the peak sanctuary cult. The emergence of the villa system in this context could be considered either as a sign of strength ('exercising palatial control over the hinterland') or as a sign of weakness ('devolving palatial power to local chiefs').

Psychological stress is a commonly observed phenomenon after traumatic natural disasters even in modern societies where volcanic eruptions are well understood from a scientific point of view and financial as well as health support are quickly made available by local governments. Driessen and MacDonald (1997) make reference to a study that tracked social behaviour in Othello, Washington State, for seven months after the eruption of Mount St Helens, USA, in 1980. The town has 5,000 inhabitants and

is located about 200 miles distant from the volcano. Over the seven months, Adams and Adams (1984) recorded a dramatic increase in rates of anxiety, depression and stress:

1 19% increase in death rate
2 21% increase in emergency room visits
3 220% increase in psychosomatic illnesses
4 200% increase in stress-aggravated illnesses
5 236% increase in mental illness
6 45% increase in domestic violence

Allocating blame is a natural response when disasters strike (Baum 1987). This can lead to the destabilisation of existing power structures, a restructuring of the established way of life and the emergence of new leaders. Unable to explain the volcanic eruption in scientific ways, it is very likely that the Minoans would have perceived the threat to have come from the sea itself which brought with it wide-ranging destructions in the form of tsunamis. The use of pumice in cult contexts testifies to its importance (e.g. pumice is found together with clay horns of consecration in Block B at Palaikastro). Likewise, the emergence of the Marine Style (Figure 8.12), a pottery style famous for its depiction of marine creatures (e.g. octopus, argonauts, starfish) and unique to the LM IB period, has been interpreted as a socio-religious response, maybe a gesture of appeasement, to the devastation caused by the sea (Driessen and Macdonald 1997) or in response to a diminished food supply (Bicknell 2000). The decline of the peak sanctuary sites points more broadly to disillusionment by the general population with the now palace-focused cult and indicates

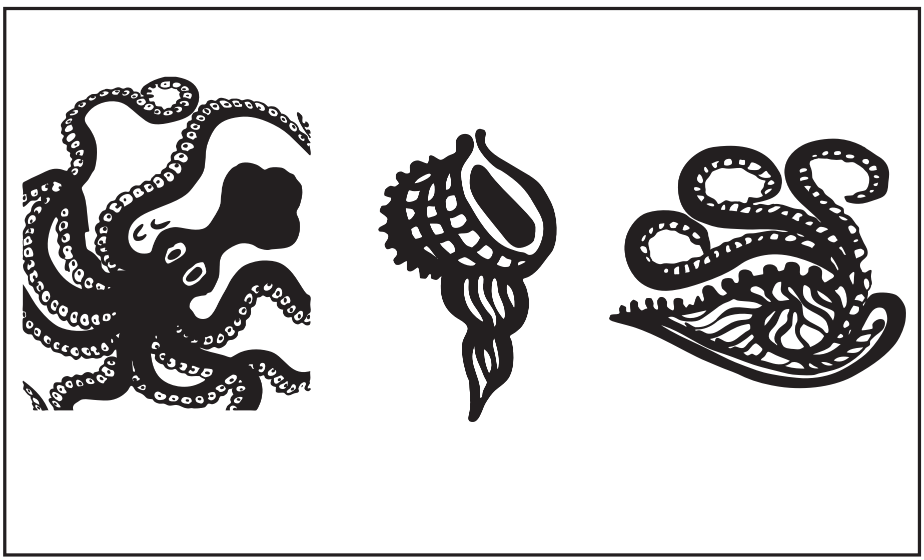


Figure 8.12 Examples of Marine Style imagery: a) octopus, b) argonaut, c) triton shell.

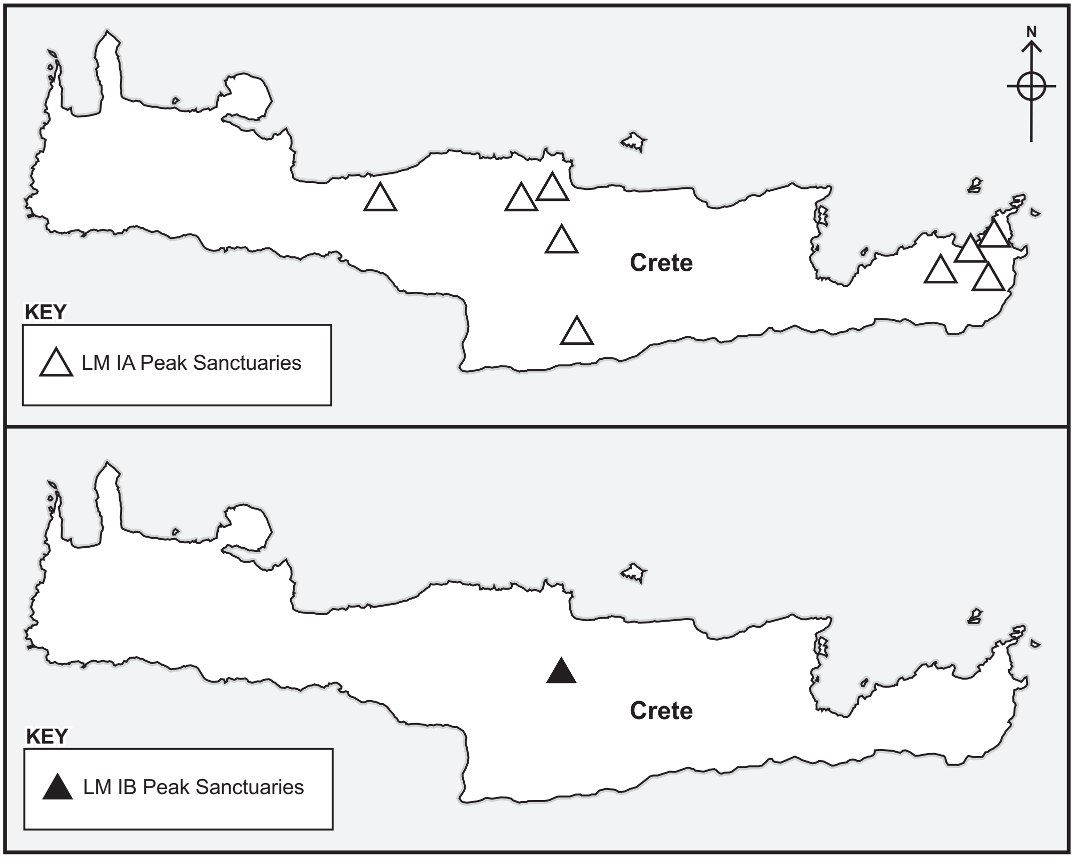


Figure 8.13 Development of peak sanctuaries (after Driessen and MacDonald 1997: Fig. 4.14).

that the palatial elites were considered to have lost divine support. Only the peak sanctuary of Mt Juktas, near Knossos, survives this challenge and shows signs of use also during the LM IB period (Figure 8.13). Instead, cults are relocated to the settlements where community shrines are now serving the general population. It is likely that the weakening of the elite in religious matters also led to their demise in more profane aspects, such as the organisation of production and control over the countryside where scholars now observe the emergence of regional elites that oversee agricultural production and the processing of produce.

In the end, there is a tentative scholarly consensus that the Theran eruption led to social and economic disorientation. This disorientation set in motion a sequence of long-term social changes resulting in the disillusionment with existing power structures, the emergence of local chiefs and religious reorientation. Thus, while the eruption's impact was indirect, it was nevertheless profound.

9

THE MYCENAEANISED ISLANDS

The Late Bronze Age period

THE MYCENAEAN BACKGROUND

LH IIA–B (Figure 9.1)

Following the volcanic eruption of Thera, Minoan influence in the Aegean regresses and Minoan palaces effectively collapse as a consequence of severe side effects. Into this vacuum enter the emerging Mycenaean palace elites that seek to expand their sphere of influence (Shelton 2010). Initially, this influence appears limited to commercial interests, in particular trade in pottery. Mainland imports increase in quantity at all sites and, in the case of Ayia Irini Period VII, add up to almost 50% of the assemblage (Cummer and Schofield 1984). A mainland provenance, specifically Athens, of almost 40 studied samples has been demonstrated by chemical analysis (Mountjoy and Ponting 2000). During this time period, Mycenaean influence is limited to pottery imports and does not yet include frescoes, settlement and funerary architecture, script, metrology or ritual objects. The subsequent LH IIB phase is not well documented in the islands with limited architectural and ceramic remains. However, evidence increasingly points towards this period, rather than LH IIIA1, as the first phase of Mycenaean imports to the northeastern Aegean islands (Cultraro 2005).

LH IIIA1–B (Figure 9.1)

Mycenaean palace societies reach their zenith of power, organisation and administration, and Mycenaean culture expands further northwards into northern Greece, westwards to Italy, eastwards into the Dodecanese and southward to Crete. This is a period characterised by stable political entities and a

Figure 9.1 Selected sites of the Mycenaean period in the Aegean (after Mountjoy 2008).

flourishing economy when Mycenaean material culture became the dominant force across the entire Aegean (Shelton 2010).

Mycenaean pottery is pervasive in the islands and has comprehensively replaced earlier Minoan influence. Much of the Mycenaean pottery is imported, made by highly skilled craftspeople and very homogenous in shape and decoration. Together with evidence of Mycenaean-type tombs and architectural features, the islands witness a profound and unifying 'Mycenaeanisation' of settlements and cultural practices, the so-called Mycenaean koine. Phylakopi, in particular, appears heavily

Mycenaeanised in architecture, religious beliefs and finds which may reflect its central role among Cycladic settlements. As with the debates around the preceding 'Minoanisation', scholars have proposed various interpretations for the observed phenomenon, ranging from a hostile take-over by the Mycenaeans to the peaceful (and often selective) adoption of desirable culturally sophisticated objects by the islanders (Barber 1999; Mountjoy 2008). Influence in the northeastern Aegean is less pervasive than in the southern regions and the most widespread elements are imported vases and similarities in jewellery, seals and metal objects. Adoption of actual Mycenaean customs or rituals is relatively rare (Girella and Pavuk 2016).

Towards the end of the LH IIIB period, destructions, abandonments and building modifications signify increasing instability on the Greek mainland which is followed by the eventual collapse of the Mycenaean palace system in the transitional LH IIIB2–LH IIIC early phase. In the islands, this instability may be visible in the construction of fortification walls, abandonment of the settlement at Grotta as well as a reduction in population on Rhodes, a reduction of Mycenaean ceramic imports and a concomitant increase in locally produced Mycenaean-style vessels (Mountjoy 2008). Overall, connections between the islands and the mainland seem to be less intense in this period.

Late Helladic IIIC (Figure 9.1)

The focus of destructions appears to have been the palace sites and, by the early 12th century BC Mycenae, Tiryns, Midea, Thebes, Orchomenos, Dimini and Pylos had all been destroyed. A multitude of causes has been proposed to explain the collapse – invasion, civil unrest, systemic imbalances and climatic change – but a consensus has not yet been reached (Middleton 2010; Dickinson 2006: 43–56). While some sites recover briefly, the social organisation is less complex. Large-scale population movement leads to the abandonment of core regions and influx of Mycenaean migrants into, for example, the Dodecanese, Cyclades, Chios and Cyprus. Writing is no longer practiced and the homogeneity of arts and craft products is superseded by local or regional traditions. Pottery and metallurgy preserve their high standard of skill, but other crafts fade before an even more rapid socio-economic decline that rang in the 'Dark Ages' (Deger-Jalkotzy 2008). The psychological effects of the collapse, population movements, abandonment and conflict are difficult to estimate. On one hand, Rutter believes that most farmers would have been relatively unaffected by the events and "weathered the actual palatial collapse of ca. 1200 B.C. well enough" (1992: 70). This contrasts sharply with Dickinson and Drews' views who considered survivors "psychologically traumatised" (Dickinson 2006: 71) and the collapse of the Mycenaean kingdoms "the worst disaster in ancient history" (Drews 1993: 3). No doubt, people would have experienced these events differently depending upon their location and degree of reliance on the palatial system.

Archaeological evidence does not provide a comprehensive picture of this period in the islands, though material culture seems diverse, with a distinctly local flavour. Grotta, Trianda and Serraglio became important centres and prospered. The evidence from the Cape Gelidonya and Iria shipwrecks speaks of the continued existence of inter- and intra-Aegean exchange networks even after the collapse

(Bass 1967; Phelps et al. 1999). Vlachopoulos' detailed study of Grotta and the rich cemeteries at Aplomata and Kamini, for example, demonstrates that this was a wealthy town during the early and middle LH IIIC period with grave goods hinting at wide-ranging regional contacts (2008). However, the abandonment of the shrine complex at Phylakopi (and quite likely the entire site) and the destruction of Koukounaries occurred no later than LH IIIC middle, foreshadowing Grotta's fate. Of particular note is the emergence of elaborate pictorial pottery styles in the Dodecanese, Crete and the Cyclades in early and middle LHIIIC that advertised their distinct regional identities and artistic vigour (Vlachopoulos 2003).

In the Cyclades, the late LH IIIC phase "is marked once again by disruption – most strikingly the destruction of the flourishing settlement at Grotta but also the reoccupation or continuation of earlier refuge sites" (Barber 2010b: 166). Archaeological evidence remains sparse and gives the impression that many sites were deserted. Material culture appears of lesser quality and quantity and may also hint at site abandonment or population reduction. The production of elaborate painted pottery has ceased. There are, nevertheless, signs of human activity across the islands. The Temple at Ayia Irini shows three late LH IIIC floors indicative of the reuse of different parts of the building (Caskey 1984). Likewise, the construction of walls over and amid the destroyed building at Koukounaries hints at limited reoccupation (Schilardi 1984: 204); so does the pottery at Ayios Andreas (Televantou 2001). The pottery discovered at these sites closely resembles that of the Argolid, Attica, Euboia, Kos and Chios, leading Mountjoy to propose an East Mainland *koine*. On balance, she considers it most likely that this mainland pottery style travelled with refugees who settled in the islands (2008: 476).

SETTLEMENT PATTERNS

Thanks to large-scale excavations and a long sequence of occupation, the best known settlements of the Mycenaean period are Ayia Irini, Phylakopi and Grotta in the Cyclades, and Trianda on Rhodes. Remains indicating small-scale occupation have come to light at Paroikia on Paros, Ayios Andreas and Tis Baronas To Froudi on Siphnos, Xombourgo on Tenos, Monolithos on Thera, Kastri on Kythera and Koukounaries on Paros. Our knowledge of Delos is inhibited by later structures (Mountjoy 2008), but scrappy architectural and ceramic remains hint at occupation in the area of the later sanctuaries. Absence of Mycenaean evidence from other islands is probably due to insufficient excavations, rather than an absence of occupation per se. Unfortunately, the overall state of knowledge is poor and we do not have a sufficiently broad evidence base to understand how island communities related to one another, or assess the nature of Mycenaean influence on Cycladic communities with confidence (Mountjoy 2008: 469).

Survey results from northern Kea show that Ayia Irini was the main settlement in this part of the island. Only one other site revealed scraps of LH III pottery (Cherry et al. 1991: 227). At Ayia Irini (Period VIII), occupation was more modest in extent. Following the reoccupation of the site, and repairs to the Temple and fortification wall in LH IIIA1, the site was destroyed by an earthquake at the end of this period. LH IIIA2 deposits are poorly preserved, LH IIIB even more so.

On Melos there are again signs of occupation outside Phylakopi. In addition to a substantial LH IIIB site at Ayios Spyridon in the west of Melos, Renfrew's surface survey brought to light sherds from two sites, including a tomb at Langada (Renfrew and Wagstaff 1982: 41). At Phylakopi, the LH IIIA1 period is marked by the construction of the 'Megaron' above the former Mansion (see Figures 6.2 Plan C and 6.18). The term 'megaron' was chosen as the building plan resembled those of central buildings in mainland palaces and likely acted as the administrative centre of the town. At the southern edge of the settlement, inhabitants erected the West Shrine in LH IIIA2. The Sanctuary was enlarged in LH IIIB by the addition of the East Shrine. At the same time a new fortification wall was added to the south of the Sanctuary to strengthen the old LC I defence system. This period appears to have been a prosperous one for Phylakopi and Melos more generally as there are also indicators of occupation again in the countryside. Evidence points to small farmsteads, though Ayios Spyridon may have been a more substantial settlement (Renfrew and Wagstaff 1982; Renfrew 1985; Renfrew et al. 2007a). This prosperity did not last and the destruction of the sanctuary (or possibly the entire site) at the beginning of LH IIIC marks the beginning of its decline.

On Naxos, the dispersed settlement pattern of the earlier part of the Late Bronze Age is superseded by a pronounced drive towards nucleation in the LH IIIA period when Grotta appears to have been the major settlement and trade centre on the island (Lambrinoudakis and Philaniotou-Hadjianastasiou 2001). During LH IIIB–C, following the interruption of trade with the Greek mainland, Grotta appeared to have lost its dominant position and we were witnessing a return to a dispersed settlement pattern with at least another four sites and three cemetery locations known on Naxos (Cosmopoulos 1998). Habitation at Grotta on Naxos stretches across the entire Mycenaean period (Vlachopoulos 2003). The first town at Grotta is dated to LH IIIA1 (Town 1). The inhabitants readily shared in the Mycenaean culture; not only did they import much of the LH IIIA1 and 2 pottery, but they also manufactured some decorated and undecorated Mycenaean pottery locally (Cosmopoulos 1998). The quantity of imported LH IIIA2 pottery suggests that the town was flourishing. Surviving house structures and walls indicate that the town was laid out according to a rectangular grid, hinting at a degree of planning and oversight (Figure 9.2). Grotta declined in the LH IIIB1 period and had been almost entirely abandoned in the IIIB2 phase. This desertion is likely to have been the result of an earthquake and subsequent flooding of the settlement. Town 2 was built in LH IIIC along a different orientation with houses packed tightly together. In the final phase a fortification wall was added, of which ca. 20 m have been unearthed (Lambrinoudakis and Philaniotou-Hadjianastasiou 2001). The LH IIIC town was a flourishing harbour town with a range of craft activities (e.g. pottery and faience workshops) that occupied an area of around 35,000 m^2, and there were richly furnished graves in the nearby cemeteries. Contacts with the Greek mainland have lessened and its locally produced pottery reflects a degree of independence and innovation (Lambrinoudakis and Philaniotou-Hadjianastasiou 2001). Two megaroid buildings (Epsilon and Gamma) have been observed in Town 1 and 2 respectively. The inhabitants abandoned Grotta at the end of LH IIIC, probably due to flooding as a consequence of the rising sea level (Vlachopoulos 2003).

Elsewhere in the Aegean Sea, evidence of Mycenaean culture is prolific, although comprehensive excavations are rare. Key sites are Serraglio on Kos, Trianda on Rhodes and Emborio on Chios. Probably the best explored island is Rhodes, although our understanding is seriously hampered by a lack of

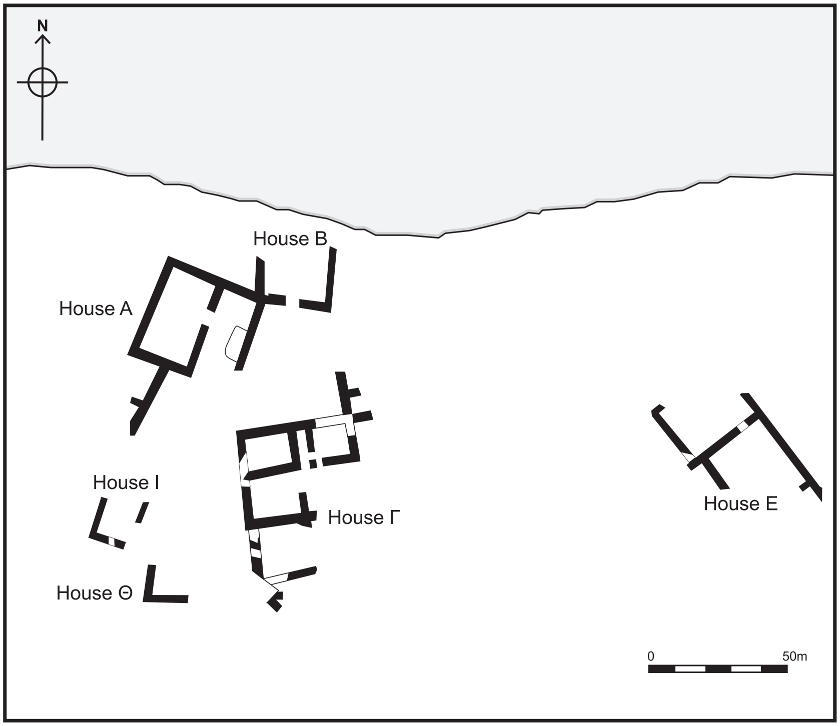


Figure 9.2 Plan of LH IIIA1–IIIB1 buildings at Grotta on Naxos (after Cosmopoulos 1998: Fig. 3).

excavations, illicit looting and insufficient publication of the original Italian excavations from the 1930s. New excavations by the Greek Archaeological Service are, however, beginning to fill our knowledge gaps. Trianda, the main town, was continuously occupied from the Middle Bronze Age and archaeologists have found flood prevention works and several house structures belonging to the LH II/LH IIIA1 period. The settlement continued into LH IIIA2 and IIIB1 but another destructive flood led to the desertion of the town (Marketou 1988, 2010, Karantzali 2005).

In addition to the main settlement at Trianda, we know of 20 cemeteries, a large number of habitation sites and numerous unprovenanced finds (Figure 9.3). Mycenaean pottery, predominantly from the Argolid, replaces Minoan wares in the LH IIB/early LH IIIA1 period and has been argued to mark the arrival of the first Mycenaeans in the north of the island. Furumark originally proposed that locals and Mycenaeans coexisted peacefully (1950: 181). However, Benzi argues that the occupation of existing houses points towards subjugation of the local population (1988: 59). Chamber tombs also appear for the first time and regularly contain weapons. Ten of the 15 swords and daggers found in tombs belong to this early time period and provide additional support for the invasion hypothesis. In LH IIIA2 Mycenaean influence is felt across all of Rhodes. Mee attributes the increase in settlement sites from nine to 23 to a second wave of Mycenaean immigrants (1982: 83). The quality of grave goods at the Ialysos cemetery illustrates the island's great wealth: gold rings, rosettes and

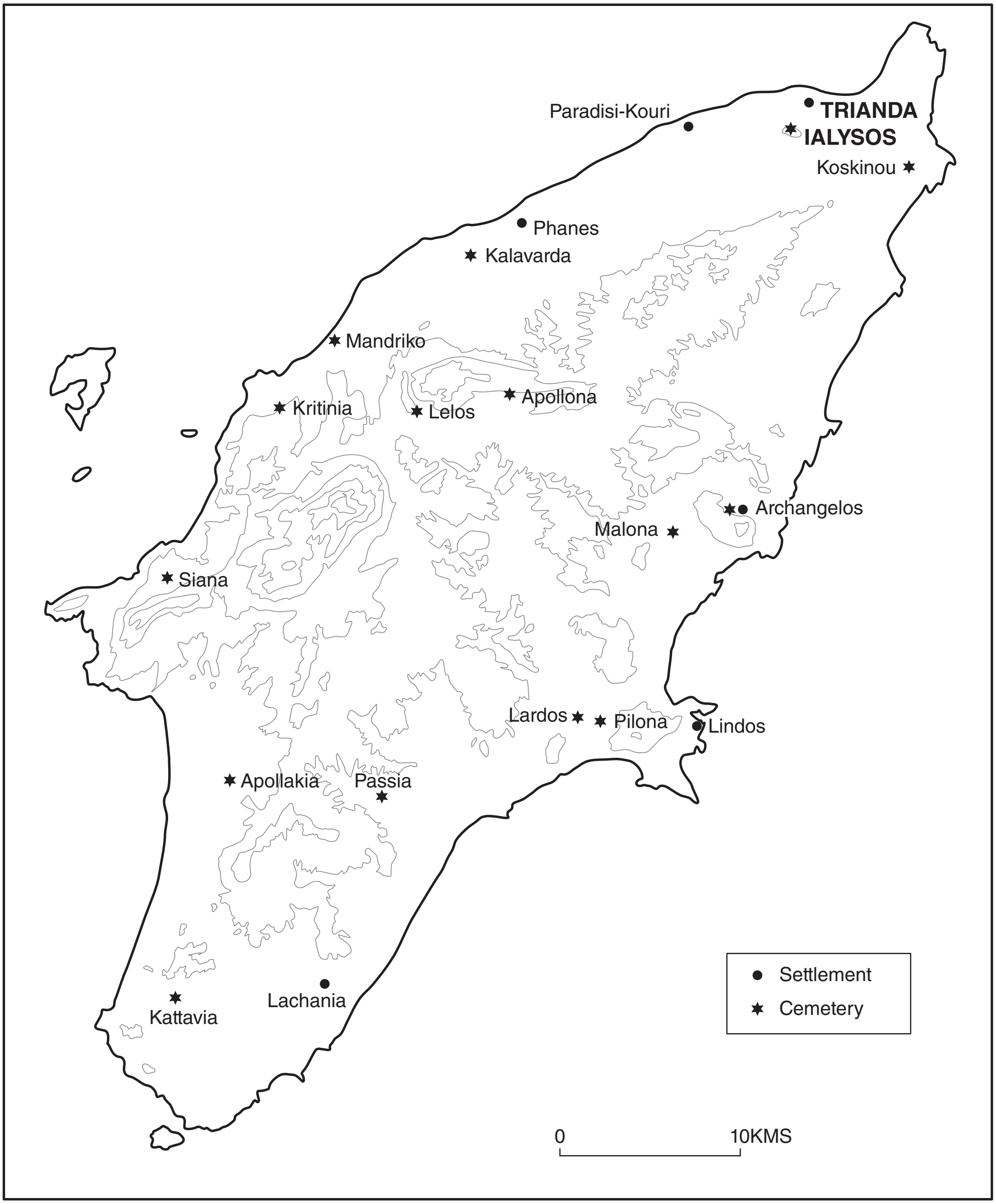


Figure 9.3 Map of Rhodes (after Mee 1982: map 1).

beads were found in eight tombs, silver and amber artefacts in three tombs, bronze weapons and tools were uncovered in 14 tombs, while glass ornaments and beads of semi-precious stones were recorded in almost every tomb (Benzi 1988a: 64). A dramatic reduction in tombs is visible in LH IIIB, although the total number of habitation sites remains broadly similar. Grave goods from the Ialysos cemetery show that, despite some depopulation of the area, the island remained prosperous. In early LH IIIC the Ialysos cemetery witnesses a sudden increase in tombs. A large number of these represent reuse of earlier ones. At the same time, the considerable reduction in settlement numbers indicates that large parts of Rhodes were being abandoned. Linking these two phenomena, Benzi interprets this as evidence of relocation of existing population from the hinterland to the central site (1988a: 70).

Mycenaean occupation is visible on Chios where an extensive LH IIIC settlement is confirmed at Emborio (Hood 1984). The settlement was short lived and destroyed by fire later in the LH IIIC period. The sudden appearance of the settlement and the Mycenaean pottery assemblage led scholars to argue for its foundation by a group of settlers from the Greek mainland. Further Mycenaean pottery has come to light at Kato Phana and Levkathia (Hood 1984).

Architecture

Generally speaking, buildings are constructed of locally available stone and follow the local tradition. Most houses are moderately sized multi-roomed structures. The exception is the megaron, a large rectangular building subdivided into an anteroom and main room with a central hearth, the central building component at Greek mainland palaces. Local versions of the megaron have come to light at Phylakopi and Koukounaries. The 'Megaron' at Phylakopi was built in LH IIIA1 (Period IV) on top of the demolished remains of the Late Bronze Age I Mansion (see Figure 6.18). The large central structure (ca. 15.5 × 8 m) was divided into an anteroom and the main central room. Separated by a long narrow passage was a row of smaller rooms to the west (Renfrew et al. 2007a; Atkinson et al 1904). Its layout and scale mark it out as the settlement's central administrative building.

The large LH IIIC mansion (22 m × > 16.5 m) at Koukounaries is located on the plateau at the top of the hill (Figure 9.4). Three basement rooms, connected by two corridors, have been preserved. A ground floor originally existed above the cellar rooms (Schilardi 1979, 1984). Finds from the cellars and those that have fallen down from the ground floor include extraordinary quantities of storage pithoi, fineware and coarseware vessels as well as artefacts of bronze (arrowheads, spearheads, razor, ladle, axe, pin, vessels, lids), lead (vase?), steatite (beads, conical weights), ivory (comb), obsidian (blades), clay (bathtub, drains, spindle whorls), rock crystal (unworked) and white plaster. The most noteworthy artefact is a large ivory fragment with relief decoration – possibly a decorative element on furniture. While the small size of cellars is typically Cycladic, the wall features and masonry style show strong Mycenaean influence. Despite the absence of evidence of a ground floor, the building's location, size and rich content, including a drainage system and bathing facilities, indicates its use as the central 'palace' of the

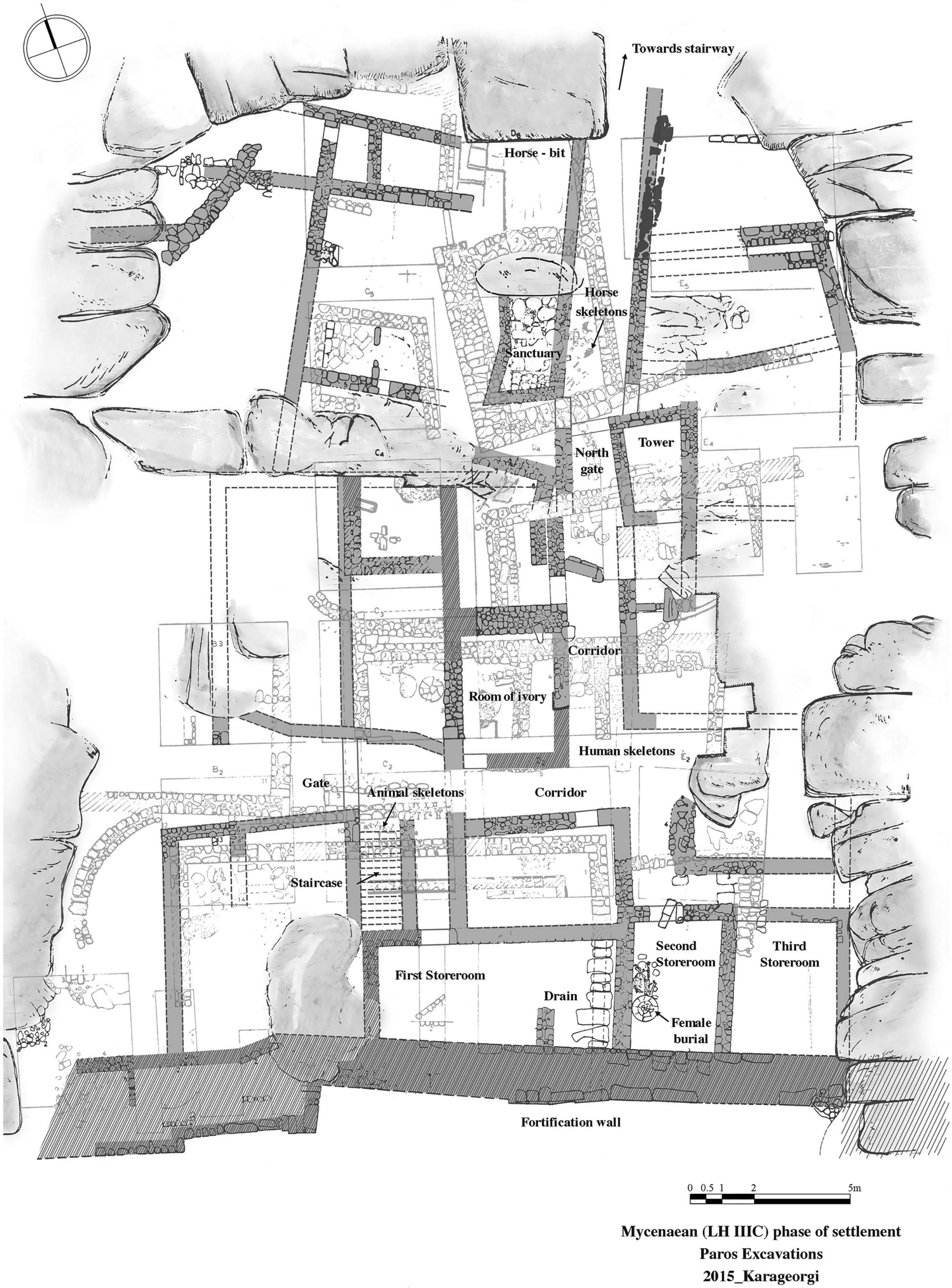


Figure 9.4 Plan of the Mycenaean mansion at Koukounaries on Paros. Image courtesy of D. Schilardi.

site (Schilardi 1979, 1984). Bearing in the mind the similarities in building style and luxury items, the excavator considered it a Mycenaean refugee acropolis which formed the centre of the local kingdom (Schilardi 1992).

Fortifications

Fortification walls had a long history in the Cyclades in particular where Middle and early Late Bronze Age examples existed at Ayia Irini, Akroterion Ourion on Tenos and Phylakopi (Hope Simpson and Hagel 2006). Thus, their strengthening, repair or first erection in the Mycenaean period continues a long-standing tradition of defensive structures in the islands and speaks of the presence of piracy and conflict throughout time.

Fortifications dating to the Mycenaean period can be found in the Cyclades at Ayia Irini, Akroterion Ourion, Phylakopi, Ayios Andreas on Siphnos, Grotta on Naxos, Xobourgo on Tenos and, most famously, Koukounaries on Paros (Figure 9.5). In the Dodecanese, remains of 'Cyclopean' walls have been noted at various islands (Leros, Kos, Telos, Syme, Chalki, Rhodes, Samos and Karpathos), although only the 30 m long wall at the Heraion on Samos has been firmly dated to the LH III period and the remainder are likely to be considerably younger in age (Hope Simpson and Hagel 2006). All fortification walls were constructed of stone, the exception being Naxos whose 3.1 m wide wall was composed of a mudbrick superstructure placed on top of a layer of large boulders (Lambrinoudakis and Philaniotou-Hadjianastasiou 2001).

A fortification wall ('Wall 100' or 'City Wall') was constructed on the inland-facing south side of Phylakopi during LH IIIB1 and probably supplemented the surviving sections of the Late Bronze Age I fortifications to incorporate the silted-up harbour. The structure was "about 2.5 m thick and at least 3 m high, built of large rounded, and mainly black boulders, up to 90 cm in length" (Hope Simpson and Hagel 2006: 111). At least 13 m of this wall survive and are visible near the East Shrine (Figure 9.6). A second wall, Wall 121, may have been the south face of the fortifications (Renfrew 2007: 63). A double circuit fortification system is also in use at Ayios Andreas on Siphnos (Televantou 2001) (Figure 9.7). The walls, built of local schist blocks with small stones as fillers, enclosed the inland hill summit and can be traced on its north, south and west sides for about 250 m. The two walls were built at least 6 m apart, thus creating a natural dry moat. The outer wall is 1.4 m thick and had at least eight small projecting rectangular towers, averaging 2 x 3 m in size, placed at irregular intervals and one large bastion in the northwest corner. The inner wall measures 3–4 m. Pottery associated with the wall dates it to the LH IIIB-C periods. The settlement was abandoned before the end of the LH IIIC period (Televantou 2001).

The best-known defence system, however, can be found at Koukounaries on Paros where Schilardi discovered a settlement on a steep coastal hill (Schilardi 1979, 1984) (Figures 9.4 and 9.8). Early in LH IIIC, the inhabitants built a large 'mansion' on the hilltop adjoining the inner face of the fortification wall, which functioned both as a defence and a retaining wall for the central building. The wall was

Figure 9.5 Mycenaean sites with fortifications.

constructed of large, roughly square stones and small stones as fillers that were quarried from the hill. The technique as well as the indentations in the western section mirror features familiar from Cyclopean fortifications on the Greek mainland. The wall is 1.66 m thick and preserved over 16.5 m. The excavator estimates that it originally reached a height of 8 m. Other wall remains along the foot of the hill might represent additional fortification structures (Schilardi 1984). A thick layer of ash marks the destruction of the citadel and mansion in LH IIIC. Within the burnt horizon, skeletal remains of both humans and animals have been discovered and illustrate the violence of the battle: cattle and sheep/goat had been brought inside the fortification walls, but were killed outside the mansion. A child had been crushed to

Figure 9.6 Western section of the fortification wall at Phylakopi (Renfrew et al. 2007a: Plate 9a). Image reproduced with permission of the British School at Athens.

death by a pithos inside the mansion and at least two other children were also killed in the basement. Skeletons of an adult man, goats and equids were found piled up in an alley outside the mansion. That the inhabitants had prepared for conflict and foreseen their need to withdraw into the fortress is clear from the large number of stone balls that had been brought to the citadel. We do not know how long the siege lasted, but it necessitated the burial of an adult woman inside the mansion basement rather than in a typical external grave (Schilardi 1984).

A similarly Cyclopean LH IIIC wall has also been observed at Xobourgo on Tenos. Twenty-three metres of wall are preserved and once protected the approach to this tall and steep outcrop. Kourou (2001) estimate that the wall surrounded an area of ca. 2,000 m^2. The wall is built of two faces with an infill of earth and rubble. Its Cyclopean nature is visible in the size of the large boulders, measuring around 2.5 x 1.5 x 1.1 m, which were used in its construction. Mainland parallels for this construction include Midea. Surface finds include ceramics and metallurgical artefacts (slag, weapon moulds) and, if dated correctly, indicate the importance of the settlement.

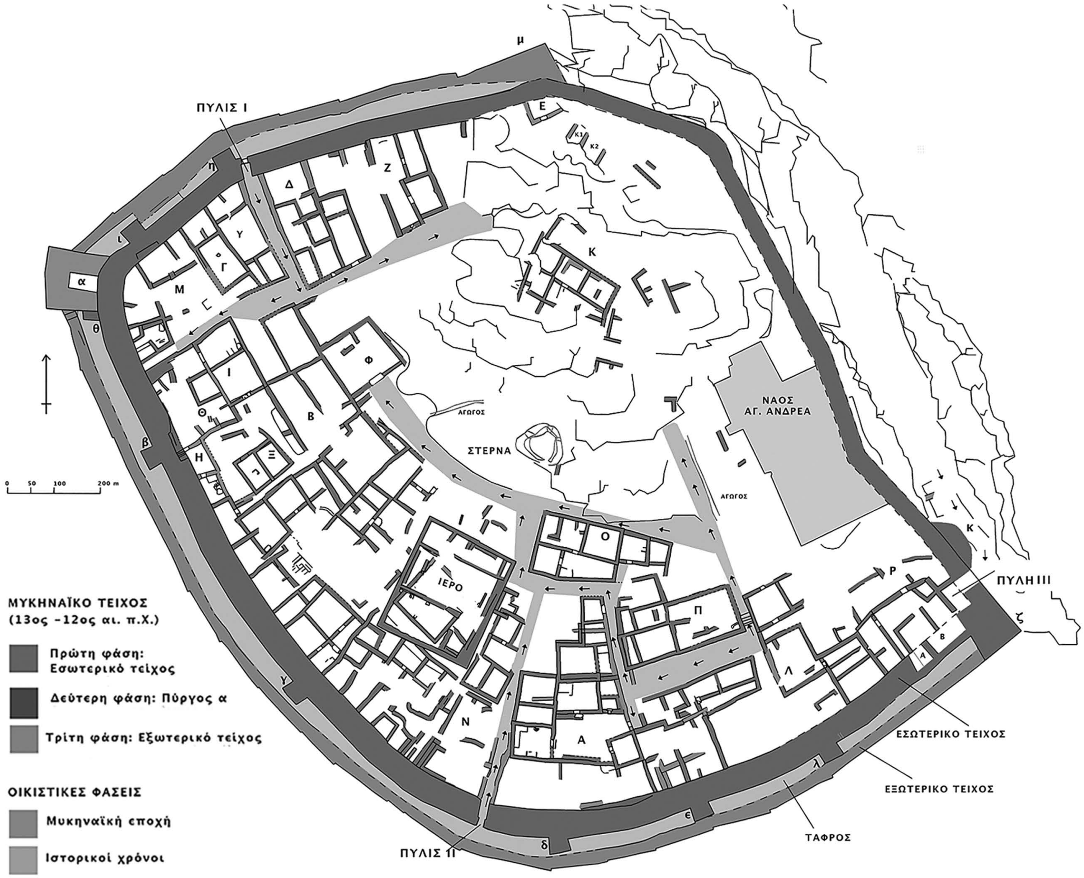


Figure 9.7 Topographical diagram of the Akropolis at Ayios Andreas, Siphnos (Theodora Katzilieri, Theodoros Hadjitheodorou, 2008) (C.A. Televantou, Siphnos, Acropolis at Ayios Andreas, Athens 2008, Fig. 93).

While fortifications have a long tradition in the islands, Schilardi, the excavator of Koukounaries, believes that these refuge sites are a new phenomenon that speak of the insecure conditions at the time, though the lack of contemporaneity of the sites has been argued to speak against such a unified trend (Vlachopoulos 1999: 83). Dated exclusively to the LH IIIC period, the construction of Koukounaries most likely represents the movement of people from the Greek mainland trying to escape the violence and social upheaval there. The close similarities in wall design and architecture as well as the abundantly rich finds and pottery with mainland affinities provides support for this hypothesis (Schilardi 1979, 1984). Barber (1999) believes that Koukounaries (and by extension Xobourgo) thus fits more closely with the phenomenon of Late Bronze Age IIIB–C refuge sites that had already been documented on Crete (Nowicki 2000).

Figure 9.8 Fortification wall (with drainage channel) at Koukounaries on Paros. Image courtesy of D. Schilardi.

BURIALS

Along with other aspects of material culture, Mycenaean influence is also abundantly visible in tomb types and burial practices. The cist tomb, the most common burial type in the Cyclades, has now become extinct. Instead, Mycenaean-style tholos tombs and chamber tombs have become a common feature especially in the eastern Aegean islands, although it is worth remembering that rock-cut tombs were a characteristic Cycladic tomb type from the Early Bronze Age. Chamber tombs typically consist of an open passage, the *dromos*, which is cut into soft rock and leads into the chamber. In many instances a *stomion*, a narrow entrance-way, separates the *dromos* and chamber. A blocking wall would be built in the *stomion* to seal off the chamber. The tholos tomb also consists of the three basic architectural elements of *dromos*, *stomion* and chamber, but is typically covered by a domed corbel-vaulted roof of stone. Both tholos and chamber tombs were for multiple burials. Following a death, the blocked door would be opened and the recently deceased would be placed inside the chamber or tholos. If necessary, older skeletal remains would be brushed aside to create space. The lack of skeletal remains at these sites prevents the use of strontium isotope analyses (which can fingerprint a person's childhood and adult home) that could confirm whether those interred had migrated to the islands from the Greek mainland or whether they were locals who had adopted Mycenaean architectural designs and practices.

Our best evidence for chamber tombs comes from the Aplomata and Kamini cemeteries on Naxos. Others are known from Ialysos on Rhodes, Eleona-Langada on Kos, and Langada on Melos (Cavanagh and Mee 1998). Tholos tombs have been discovered at Ayia Thekla on Tenos, Angelika on Mykonos and Chosti on Naxos. Other tombs reported from Mykonos no longer exist, and some of the rock-cut tombs near Phylakopi may belong to the Late Bronze Age III period but lack dating evidence to confirm this

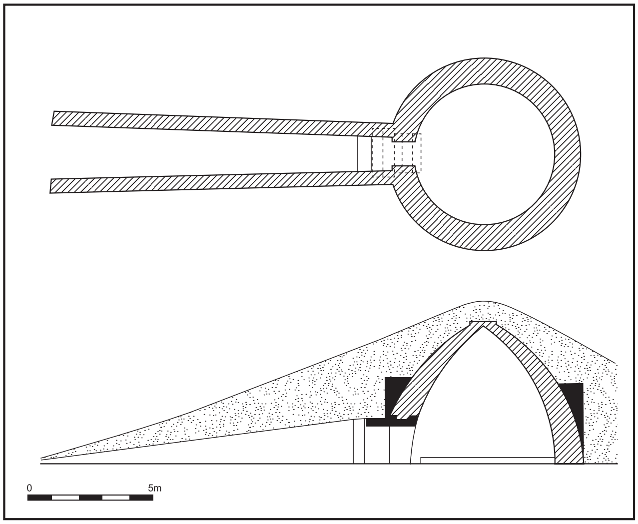


Figure 9.9 Plan and cross section of the tholos tomb at Angelika on Mykonos (after Pelon 1998: Fig. 22).

hypothesis. Some islands, however, remain wedded to their own traditions: Kytheran funerary architecture, for example, exclusively draws on familiar Minoan prototypes; its only reference of Mycenaean customs is the use of characteristic clay figurines (Broodbank, Kiriatzi and Rutter 2005: 89).

Not many tholos tombs have survived and some tombs originally thought to be of tholos-type later revealed themselves to be chamber tombs. Angelika on Mykonos is a rather imposing tholos tomb. Built of local stone, its chamber measures 5.8 m in diameter and the *dromos* is 14 m long (Figures 9.1 and 9.9). The discovered pottery, most of which was imported, dates its use to the LH IIIA2 and IIIB periods. Alongside clay vessels, finds include three rock crystal seals, two gold necklaces and one faience object. The size of the tomb and the diversity and quality of finds make it likely that the tomb belonged to a wealthy family (Mountjoy 2008: 473). The tholos tomb at Ayios Thekla, spanning LH IIIB–C, is considerably smaller and of cruder construction using local unworked stones. Its chamber is only 2.9 m in diameter but had the typical mainland corbelled roof design. The nine burials were accompanied by 38 vases, bronzes, gold beads and a sealstone, again indicating use by a prosperous family group (Mountjoy 2008: 473).

Hundreds of chamber tombs have been uncovered in the Aegean islands. Our most comprehensive evidence comes from Naxos and Rhodes. Located on the hillside above Grotta town on Naxos are the cemeteries of Aplomata and Kamini, which were in use during the middle and late LH IIIC period. Given the proximity of the two cemeteries, archaeologists have speculated that they may not represent distinct cemeteries but rather grave clusters for discrete family groups or clans (Vlachopoulos 1999, 2008; Barber 1987: 237–238).

Aplomata has four chamber tombs; three cluster together closely and one is located 120 m away. At Kamini there are four chamber tombs. The dead were accompanied by rich grave offerings that included

clay vases, jewellery, weapons and tools. Two burials stand out as different: a child pit burial at the top of the Kamini Hill which brought to light four gold plaques with representations of a child, and a warrior burial on the northern edge of the Kamini cemetery. The warrior burial is unusual in that he was placed within a thick layer of ash from animal sacrifices. Fine pottery, seals and gold jewellery accompanied the deceased (Vlachopoulos 1999, 2008; Barber 1987: 237–238).

On Rhodes, at least 20 cemeteries or cemetery clusters have been reported. The chamber tomb cemetery at Ialysos on Rhodes is the largest on the island with 150 tombs. It spans the LH IIB to LH IIIB periods, and shows a brief revival in LH IIIC. The tombs are arranged in clusters with "long and steep dromoi cut into the soft rock and arranged in rows" (Marketou 2010: 786) (Figure 9.10). The cemetery's use waxes and wanes over time: its earliest use in LH IIB is associated with the first appearance of Mycenaeans at Trianda. Paralleling events elsewhere on Rhodes, the number of tombs increases dramatically in the LH IIIA2 period. The high-quality grave goods, mainly imported vases from the Argolid, highlight the prosperity of the nearby settlement of Trianda. The abandonment of Trianda in LH IIIB leads to a corresponding decline in the cemetery. Considerable amounts of pottery are still imported, but they now add up to less than 50% of the total assemblage. The cemetery's fortunes are revived in the LH IIIC period when Trianda is resettled. Opinions are divided about the origin of these settlers with some believing that they were Mycenaean refugees from the Greek mainland, while others consider them to be Rhodians moving to the central town from outlying settlements (Benzi 1988a: 70; Marketou 2010: 788; Mee 1982).

The grave goods deposited in the Ialysos tombs range from clay vases, bronze weapons and tools, gold jewellery, gold and silver ornaments, beads of glass and semi-precious stones, to amber and faience objects; they are an indicator of the settlement's general level of prosperity. Particularly notable is the great variety of Greek weapons, such as knives (Type A), swords (Type B, Ci, Cii, Dii) and daggers (Type Eii). The grave goods also attest to the island's wide-ranging trade connections with other regions in the eastern Mediterranean. In addition to imported Mycenaean pottery from the Greek mainland, excavations have revealed vases from Crete, jewellery from Cyprus, Cypro-Syrian cylinder seals and a Cypriote-type dagger, as well as Egyptian faience scarabs and ostrich eggs (Marketou 2010: 788; Mee 1982).

A special type of tomb is the so-called warrior-grave. While graves with pronounced military character have been attested in Greece since the Shaft Grave era, their display became particularly ostentatious in the LH IIIC period. As shown by a recent review by Deger-Jalkotzy (2006), LH IIIC warrior-tombs were a common phenomenon in the Aegean, with 15 mainland and three Cretan cemeteries showing evidence of one or more of these tombs. In the islands, warrior graves have been located at Grotta on Naxos, Passia on Rhodes and Langada on Kos. The tombs typically contained at least one sword and one spear alongside other military objects, such as daggers, knives, helmet, greaves and shield, personal grooming items and prestige objects (Figure 9.11).

The Mycenaean chamber-tomb cemeteries at Aplomata and Kamini on Naxos were extraordinarily rich in finds (e.g. precious metal, ivory, pottery, seals) and revealed the wealth of the local community and its far-reaching contacts across the Aegean (Deger-Jalkotzy 2006). Kamini Tomb A and Aplomata Tomb A at Grotta stand out as warrior-tombs due to the presence of Naue II swords and other precious

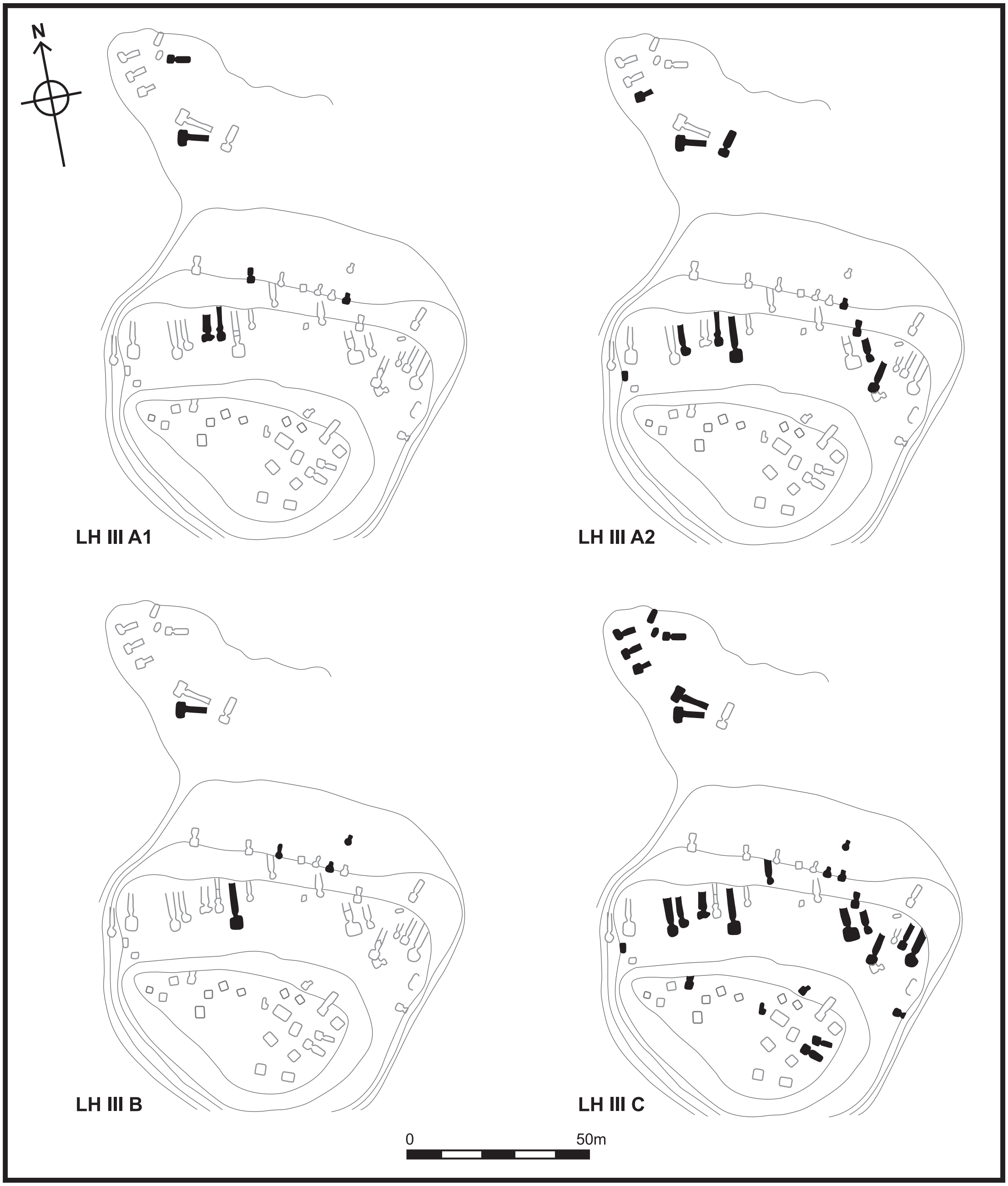


Figure 9.10 Development of the chamber tomb cemetery of Moschou Vounara, Ialysos, Rhodes (after Cavanagh and Mee 1998: Fig. 6.7).

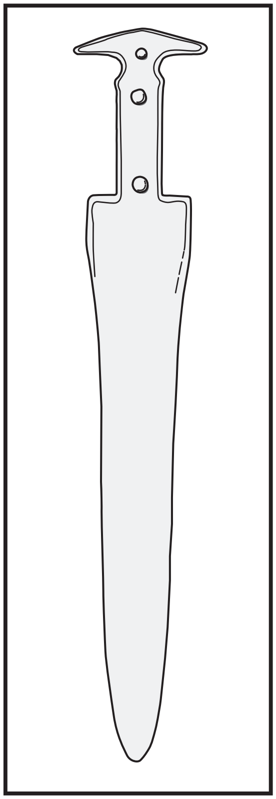


Figure 9.11 Reconstructed short sword from Grave 2, Passia cemetery, Rhodes (after Dietz 1984: Fig. 25).

objects, such a curry-comb for horses. A third tomb near Chamber Tomb Delta was left open and contained the burial of a warrior on top of a pyre with spearheads, gold, silver and bronze jewellery, a seal and much decorated pottery. A Naue II sword, spearhead and were also found at Tomb 21 at Langada, Kos. Intriguingly, the sword had been bent indicating that its power had been ritually 'killed'. At Passia on Rhodes the tomb contained a Naue II sword, knife, arrowhead, silver and bronze jewellery and pottery (Deger-Jalkotzy 2006).

Alongside tombs with rich and exotic finds, warrior-tombs are considered to represent the elite section of the population. Following the demise of the palaces and freed from the shackles of an overbearing political authority, autonomous local communities were expressing their wealth, social ranking and military prowess in the burial domain. The concern with the military ethos is also visible in decorated kraters that frequently depict armed warriors marching, fighting or riding on chariots. Deger-Jalkotzy interprets this phenomenon as an indicator of a re-emerging political elite, if not a kingly leader (2006).

It is difficult to reconstruct funerary ceremonies in detail (see Cavanagh and Mee 1998: 103–120 for a helpful attempt; also Georgiadis 2003), but the archaeological evidence from island cemeteries points towards several important elements. Grave goods are an essential component of funerary rites

and accompanied every dead person. As the tombs contained multiple burials, it is generally impossible to assign specific artefacts to individuals. Assessment of wealth or status differences as well as gender-specific grave goods is therefore impossible. However, all tombs contained plentiful grave goods. Some of the finds may have been worn by the dead, such as the 85 gold rosettes found at Naxos that were probably sewn onto the deceased's clothes (Barber 1987: 237) and may point to some kind of procession from the town to the cemetery. Strainer hydrias were regularly found in pits outside the Naxian tombs and hint at libation ceremonies that took place at the time of burial or during memorial events (Vlachopoulos 2008: 523). Additional funerary customs are visible on Rhodes. These include the placement of grave markers, such as the incised stone blocks found at Makria Vounara; the carving of platforms or benches inside some chambers at Ialysos; and, more unusually, the use of cremations instead of the traditional inhumation burial in six instances at LH IIIC Ialysos – a practice also observed at Müskebi, Kos, Karpathos, Astypalaea, Naxos and Perati (Cavanagh and Mee 1998: 93–94).

RELIGION

Evidence of clearly religious locations or structures is comparatively scarce in the Mycenaean period and, apart from a preference for ancillary rooms and platforms, the structures do not follow a common architectural template (Whittaker 1997). The best known examples in the islands are the 'Sanctuary' at Phylakopi and the Temple at Ayia Irini. A lesser-known location is the sanctuary at Mt Philerimos on Rhodes. The evidence is too sparse to deduce coherent ritual practices; suffice it to say that sacrifices, libations, figurines and votive offerings form part of the ceremonial repertoire. Minoan elements, which were so dominant during the early Late Bronze Age, have largely disappeared and are replaced by artefacts of Mycenaean character.

The Sanctuary at Phylakopi (Figure 9.12) consists of the West Shrine, East Shrine and an outside street/courtyard area (Renfrew 1985). Scholars have emphasised its architectural and artefactual affinities with Mycenaean cult buildings on the Greek mainland, such as Ayios Konstantinos on Methana and the Cult Centre at Mycenae (Renfrew 1985: 407–411; Whittaker 1997: 9). It is located adjacent to

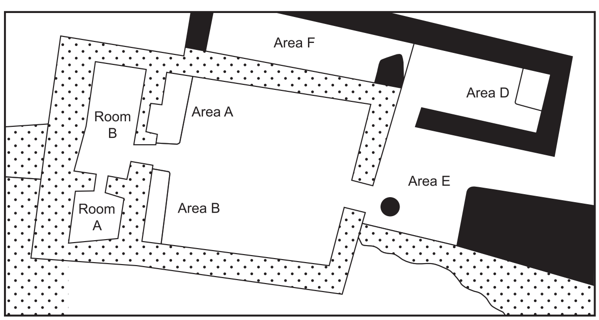


Figure 9.12 Plan of the Sanctuary at Phylakopi during LH IIIB/C early. West Shrine in stippled outline. East Shrine in solid black outline. (after Renfrew 1985: Figs. 2a/2b).

the massive Mycenaean fortification wall along the southern border of the settlement. The West Shrine was the first of the structures to be built in LH IIIA2. Following an approximate east-west orientation, the large square central room was entered through a door on the east side. A narrow room, divided by a cross-wall, lies at the western end (Rooms A and B). The building was constructed of dressed local tuff and had two small back rooms. Our knowledge of the interior is limited: a hearth of stones was situated in the southeast corner. Two stone platforms were placed in front of the west wall that divide the large from the small room and a pair of niches was inserted into the wall. Niches are also present in Rooms A and B. The interior walls may have been plastered. It is unclear whether columns supported the roof. The East Shrine was added not long after the erection of the new fortification wall in LH IIIB1 and both shrines were in use simultaneously. The East Shrine is a narrow rectangular room that was entered through a doorway in the south wall. It contained a platform topped with flat stones in the northeast corner. In front of the two shrines was a paved courtyard area with a sizeable, roundish, roughly hewn stone of local tuff that the excavator interpreted as a *baetyl*, a stone used in the invocation of deities (Warren 1988: 16–19). Nearby was found an assemblage of pots predominantly used for the handling of liquids (e.g. kylikes, jugs, dipper, amphorae, hydriae) – quite possibly for use in libations. Following an earthquake or human intervention, the shrine structure was heavily damaged. Modifications were made to the building and cult activity continued, albeit diminished. The complex eventually went out of use in LH IIIC (Renfrew 1985).

Portable finds include a large number of different artefact categories: clay human and animal figures, including a chariot group, bronze objects, ostrich eggshell fragments, a silver ring, sealstones, stone lamps, glass, pottery, conch shell, tortoise shell, loomweights, spindle whorls and bone pins (Renfrew 1985). The most important of these finds are undoubtedly the clay figurines. Among these is the famous *Lady of Phylakopi* found displayed in Room A (Figure 9.13). She was found “headless in the corner in an upright position, with a complete female figure standing beside her” (Renfrew 1985: 112). Her head was found 50 cm to the east, but her arms remain missing. Fifty centimetres high, the figure stands out for the quality of manufacture (wheel-thrown) and design (red and white decoration on a pale clay background). Based on stylistic parallels, the figure has been dated to the LH IIIA2 period. Visual inspection of the fabric makes it likely that the figure had a mainland (Argive?) provenance (French 1985: 215).

Drawing on the architecture and the portable finds, the excavator is confident that the shrine complex fulfilled a religious function (Renfrew 1985). The use of the structure and the rituals performed is best understood from the phase just prior to its collapse and shows how different sections of the rooms were dedicated to specific cult rituals (Figure 9.14). For example, male figures were only found at the northwest platform in the West Shrine; they were accompanied by a chariot group and a driven ox. In contrast, female figurines were restricted to the southwest platform (as well as the niche and Room A). Bovine figurines were associated with both platforms. No human figures or figurines came to light in the East Shrine, though animal figurines and bovine figures are present as well as a chariot group and a driven ox. This distribution of finds led the excavator to conclude that cult rituals in this sanctuary were gendered along binary categories: males were associated with the northwest platform and females with the southwest platform. A less clear-cut dichotomy can be proposed for the West and East Shrines themselves, with the former dedicated to humans (*with* animals) and the latter to animals only (Renfrew 1985).

Figure 9.13 'Lady of Phylakopi' (https://commons.wikimedia.org; CC BY-SA 4.0).

	West Shrine				East Shrine
	Area A	*Area B*	*Room A*	*Niche, Room A*	*Area D*
Female figure	0	0	4	1	0
Male figure	3	0	0	0	0
Female figurine	0	2	0	0	0
Bovine figure	1	0	1	4	3
Chariot group	2	0	0	0	1
Driven ox	1	0	0	0	1
Animal figurine	2	0	0	0	11
Sealstone	0	0	0	0	0
Double vase	0	2	0	0	0
Pedestal vase	0	0	1	0	0
Columnar lamp	0	1	0	0	0
Bronze bird	1	0	0	0	0
Beads	12	6	0	1	2
Other metal	2	2	0	0	5

Figure 9.14 Distribution of finds across different areas within the Sanctuary at Phylakopi during LH IIIC early (after Renfrew 1985: Table 9.1).

Regarding our knowledge of the deities, no life-size cult image has come to light. However, the *Lady*, together with the largest of the male figurines, may have functioned as a cult image. The remaining figures and figurines, alongside beads and small metal objects found sprinkled around the platforms, have been interpreted as votive offerings (Renfrew 1985: 372). More broadly, the platforms and niches with all the objects in clear sight serve as unmistakable foci of ritual action in the shrines. The existence of lamps and conch shells points to the use of lighting effects and music in ritual performances (Renfrew 1985).

Despite extensive destruction at the end of the Period VII, the Temple at Ayia Irini continued in use almost uninterrupted (Caskey 1984, 1998). The town's inhabitants quickly went about clearing out the debris, rebuilding walls and rearranging the interior of the Temple during LH IIIA. Most rooms (1, 2, 3, 5 and 6) remained in use (Figures 6.12 and 6.5). Changes included the addition of a plaster pavement in Room 6 and a finely plastered threshold for Room 3. Two u-shaped platforms were constructed along the northwest wall of Room 6 and, in LH IIIB, a bench against the southwest wall. The westerly structure contained a trench, interpreted as a possible receptacle for sacred offerings as broken objects (e.g. arm fragment of a clay statue) were found in-situ (Caskey 1998: 126). Room 5, in which the lower body of a clay statue was discovered standing on the floor, was originally considered a storage room. However, the presence of this LH IIIA2 figure makes it equally plausible that the room was actually the sacred focus of the building and that at least some elements of the original cult continued into the Mycenaean period (Caskey 1998: 126). During the LH IIIC period, platforms were located along the northeast and southwest walls of Room 6; they either served as benches or votive

platforms. A new element is visible in the altar or hearth which indicates continuity in sacrificial practices. Eventually the Temple was destroyed before being reused in Protogeometric and Geometric times (Caskey 1998).

Mycenaean finds from the Athena sanctuary on Mt Philerimos on Rhodes have inspired archaeologists to consider this location sacred during the LH IIIA2–B period. The presence of marble pommels, a Cypriot bronze mirror, pottery, two clay animal figurines, an ivory mirror handle, four cylinder seals, two seals and several carnelian beads assign a votive character to this assemblage (Marketou 2009).

POTTERY

Palatial

Following the collapse of the Minoan palaces at the end of LM IB, the pattern of trade and the direction of cultural influence changed in the Aegean. Gradually, but not immediately, Mycenaean Greece superseded Minoan Crete as the main cultural reference point; pottery shapes and decorative designs across the Aegean islands were now deeply indebted to Mycenaean prototypes and a large percentage of pottery was imported from the Greek mainland, though locally produced imitations were gaining ever greater traction from LH IIIA2 onwards (Mountjoy 1999).

By LH IIIA1 the Mycenaeans had expanded into the vacuum left by Minoan traders and Mycenaean pottery is found on many of the Aegean islands, and indeed at Anatolian coastal sites. This pottery is imported from the Greek mainland and is standardised in shape and decoration. Karpathos, an immediate neighbour of Crete, is the only island that clings on to the Minoan potting tradition. The most popular shapes in the Aegean islands are the kylix, stirrup jar, piriform jar and alabastron. Closed shapes were presumably desired for their content – scented or unscented oils most likely – while fine tableware was popular for its high quality craftsmanship. Common motifs are the flower, foliate band and multiple stem.

It is in the LH IIIA2 period that Mycenaean influence reached its greatest expansion with mass-produced mainland pottery that extended into ever more distant areas, such as Epirus, Cyprus, the Near East and Italy. Mycenaean pottery remains a popular import also in LH IIIB, although perhaps in lesser quantities. The kylix and stirrup jar remain the most popular shapes (Figure 9.15), while flower and whorl-shell dominate the motif repertoire.

The standardised appearance of pottery shapes and fabric had long made excavators believe that one or more Greek production centres were responsible for their manufacture. However, it was only through provenance analyses that were able to pinpoint the geological origin of the fired clay pots that the importance of the northeast Peloponnese as a highly specialised production location became apparent (Jones 1986). Morris and Jones' study of imported Mycenaean wares at Ayia Irini confirmed the dominance of the northeast Peloponnese for decorated finewares in LH IIIA1. During LH IIIA2, however, imports also reached the island from Attica. As far as undecorated finewares are concerned, their production centres were less centralised and vases from several regions (northeast

Figure 9.15 Common LH IIIA2 pottery shapes from Ialysos, Rhodes. a) kylix, b) stirrup jar, c) piriform jar, d) alabastron (after Mee 1982: Plates 6, 10, 12, 16).

Peloponnese, Attica, Aegina (?) and Euboia) reached Ayia Irini during the LH IIIA1 and IIIA2 periods (Morris and Jones 1998). With 118 LH IIA–LH IIIB1 samples processed, the provenance analysis of Rhodian pottery represents the most comprehensive programme of analysis for Mycenaean period pottery in the Aegean (Marketou et al. 2006). The results highlight the eminence of the northeastern Peloponnese, especially the regions around Mycenae and Berbati, as the main producers of Mycenaean pottery from Rhodes during the LH IIA to IIIB periods. Additionally, however, this study throws light on the existence of minor production centres, such as Tiryns, Boeotia, Euboia, Crete and an unknown Argolid location. Alongside imports, the study confirmed the existence of a local Rhodian workshop whose products were inspired by Mycenaean shapes and decorative schemes. Rhodes also received plain ware vases and storage jars from the neighbouring island of Kos (Marketou et al. 2006). The clear regional demarcation of the main production centres and their clearly defined repertoire of shapes and motifs indicate producer and product specialisation. Scholars have therefore postulated the existence of pottery workshops in the Argolid that were producing specifically for the export market, either as independent entrepreneurs or under palatial supervision (Marketou et al. 2006).

Post-palatial

Following the disturbances on the Greek mainland, imported Mycenaean pottery of the LH IIIC period sees a dramatic change: it now only adds up to a small percentage of each pottery assemblage (Mountjoy 1999: 889–891, 2008). Instead, much of the Mycenaean pottery is produced locally alongside indigenous traditions. Ayia Irini, Phylakopi and Koukounaries, for example, had stronger links with the Greek mainland than Grotta whose repertoire had a distinctly local flavour and, rather unusually, displayed affinities with the Minoan tradition. During LH IIIC Naxos was also an important production centre of pictorial pottery, particularly the Octopus Style (Vlachopoulos 1999, 2003). The assemblage from Koukounaries on Paros had a predominantly local appearance (Koehl 1984; Schilardi 1984). On Rhodes, stylistic links between the island and the Greek mainland are "thin" and locally produced wares are most strongly indebted to LH IIIB motifs (Benzi 1988b: 258). As a consequence of the disruptions, the pottery no longer has a common origin and is less uniform in style. However, trade and interaction continues and pottery is exchanged between regions; while no longer uniform, these regular interaction nevertheless created a shared cultural repertoire, a *koine* (Mountjoy 1993, 2008).

METALLURGY

Lavrion continues to be the prime multi-metallic source during the Late Bronze Age. Stos-Gale and Gale (2003) estimate that less than 20% of metal found on Greek mainland sites was imported. The same picture exists in the Dodecanese where analyses of metal objects from Ialysos on Rhodes and Pilona on Kos also show the predominance of Lavrion. Copper from Cyprus or the Taurus region only makes a small contribution. Six of the nine LH III lead samples from Renfrew's excavations at Phylakopi originate from the Lavrion mines. Interestingly, two objects have a Siphnian provenance, indicating that Cycladic mines continued to be exploited into the Late Bronze Age; the chemical profile of one object does not fit any of the known sources in Greece or Anatolia (Stos-Gale 2007).

Lead balance weights, proliferous in the preceding Minoanising period, are no longer found in the islands. The only examples come from mixed LH II–III deposits from House A at Ayia Irini (Petruso 1992).

THE END OF THE BRONZE AGE

There is no definite destruction horizon that marks the end of the Bronze Age in the Aegean, but settlements were abandoned gradually as the economic situation worsened. The collapse of the Mycenaean palatial system was comprehensive and there is no longer evidence of centralised political organisation, writing or elite craft production. While the quantity of data is increasing steadily for this time period, the drop in complexity nevertheless provides support for its original description as the 'Dark Age' (e.g.

Snodgrass 1971; Desborough 1972). Nowadays scholars argue that there is sufficient archaeological evidence to dispense with this depreciative term and consider this period on its own merits (Dickinson 2006; Papadopoulos 1996; Whitley 1991). In the Cyclades, the evidence is limited to scant remains of pottery, mainly dated to the late Protogeometric period, ca. 950 BC. A handful of vases or sherds are attested from Andros, Tenos, Amorgos, Paros, Kea, Siphnos, Melos, Delos, Rheneia and Thera – the northern islands follow the Euboian ceramic style while the south-central islands imported or imitated Attic vases (Lemos 2002: 207–208). Only Naxos offers more information, such as the cist and pit cemetery at Grotta that contained both inhumation and cremation burials, and it is possible that the island was occupied continuously into the Iron Age (Lemos 2002: 179–180). Evidence from the Dodecanese is equally sparse, and is largely limited to late Protogeometric funerary remains from Serraglio on Kos and Ialysos and Kamiros on Rhodes (Lemos 2002: 180–182). Although there is no direct evidence of continuity in occupation, the presence of Submycenaean material from the Anatolian coast and possible (as yet unpublished) finds from Kos allow for this possibility. The local pottery has a strong individual character that combines influences from Euboia, the Argolid, Cyprus and the Anatolian region. The same applies to the extant metalwork that was deposited in the graves (Lemos 2002: 208–210). The lack of investigations at Lemnos, Lesbos, Chios and Samos hampers our understanding of the northeast Aegean islands, and it is uncertain whether there was continuity of settlement between the Bronze and Iron Age. Nevertheless, late Protogeometric pottery has been discovered on all of them (Lemos 2002: 210–211).

CONTEXTUALISATION: COLONISATION, MIGRATION OR EMULATION?

There is no denying that Mycenaean culture penetrated the islands deeply. In addition to an abundance of imported Mycenaean pottery, often mass produced and standardised, Mycenaean-style chamber and tholos tombs and architectural features, such as the megaron and 'Cyclopean' wall constructions, there is also more ephemeral evidence such as the use of Phi and Psi clay figurines in ritual ceremonies. Scholars have put forward several hypotheses to explain the underlying reasons for the observed Mycenaeanisation. They range from hostile action to immigration of Mycenaean settlers to cultural emulation.

Several scholars support the view that, in relation to the Cyclades, the strong affinities with Mycenaean material culture are the consequence of a military take-over by a Mycenaean ruler who installed himself on one of the islands (Scholes 1956; Barber 1999). Evidence of conflict or warfare is not unusual in the LH III period. Archaeologists are familiar with iconographic representations of conflict already from the famous Late Cycladic I wall paintings at Akrotiri on Thera which show warriors, battle scenes and warships. Archaeological finds of swords, daggers, arrows, spearheads and sling stones demonstrate the reality of warfare in the Late Bronze Age Cyclades. The widespread occurrence of fortifications at, for example, Ayia Irini, Phylakopi, Grotta, Koukounaries, Ayios Andreas and Xobourgo is a visual reminder that outside threats exerted constant pressure on local communities. Taken together with the defensive location on steep hilltops that afford a degree of natural protection, some of these sites were clearly chosen with the aim of providing shelter, safety and security for their

inhabitants. Unfortunately, these fortifications were not always sufficiently strong to prevent hostile incursions, as the destructions at Grotta and, most dramatically, Koukounaries demonstrate (Barber 1999).

The presence of Mycenaean elements in the Cyclades is readily apparent in the material culture: there are numerous imported Mycenaean vases, imported Mycenaean funerary figurines, including the famous *Lady of Phylakopi*, as well as exotic small finds. The most compelling evidence, however, is visible in the adoption of Mycenaean-style tomb designs (and one therefore would assume funerary practices) and typical architectural designs, such as the megaron, an essential design feature of a Mycenaean palace, as well as construction techniques of fortifications. In particular, it is the rather demonstrative placement of the 'Megaron' at Phylakopi on top of the previous central building, the 'Mansion', in LH IIIA1 that suggests to Barber a deliberate act by a local Mycenaean ruler (1999). Influence elsewhere in the Cyclades he considers indirect, though Caskey had previously proposed a similar 'political rule' scenario for Ayia Irini on Kea (1969).

Most scholars, however, considered emulation the more likely explanation. Schallin (1993, 1998) investigated site distribution, site patterns, architecture, tombs and small finds for clues of a definite Mycenaean presence in the islands, but failed to find supporting evidence. She concluded that the preferred settlement location near the coast is a long-standing Cycladic tradition and so is the existence of hilltop sites. Site patterns changed considerably over time, but there was no indication that any of the 'late' Late Bronze Age changes were in response to a Mycenaean administration. Architectural styles follow the local traditions. The 'Megaron' at Phylakopi is the only exception to this rule, but could be explained with reference to a local chief wishing to emulate an emerging power symbol. Tomb types are frequently local, although Mycenaean-style tholos tombs have been reported in two locations. Chamber tombs, she argues, are found across the entire Aegean and thus cannot reflect an exclusive Mycenaean custom. Finally, portable finds, such as imported pottery and local imitations, imported raw materials or finished objects (e.g. metal objects, boar's tusks, ivory, sealstones, stone spindle whorls, clay figures) indicate frequent trading contacts and a shared cultural repertoire, but are not evidence of an actual presence or any kind of political domination. Instead, she argues that the Aegean was "a region where small rivalling chiefdoms interacted economically, socially and religiously" (Schallin 1998: 179); that is, they acted as independent, but interconnected, peer polities. Competition, rivalry and conflict between settlements resulted, when peaceful, in prestige-enhancing strategies, such as the building of grand buildings or large tombs, or the deposition of exotic materials with the dead. However, when hostile, such competition caused warfare and destruction (Schallin 1998: 179–180).

With little Mycenaean material found, the northeastern Aegean islands have not yet been a major focus of discussion. However, the Dodecanesian evidence has stimulated similar debates to those seen in relation to the Cyclades, despite clear evidence of an independent and long-standing local tradition with links to Anatolian culture. Nevertheless, Furumark (1950) originally proposed that Mycenaean colonisers – visible in the manifold chamber tombs – had taken over the governance of Rhodes. The coloniser hypothesis was given credence by the existence of three warrior burials at Ialysos in LH IIB–IIIA, a time when the first palace societies were establishing themselves on the Greek mainland. These weapon-rich burials have been interpreted as representing a Mycenaean

military elite (Benzi 1988a, 1996). This pattern contrasts sharply with Kos which shows fewer chamber tombs for this early period and scarcely any weapons (Benzi 1996: 949). Reasons for the original colonising drive were sought in the Mycenaeans' desire for land-acquisition or control of long-distance trade routes akin to strategies pursued by the Hittite and Egyptian empires. However, these interpretations neglected to take into account the nature of Mycenaean kingdoms that, at this point in time, were small and concerned with firstly establishing their control in mainland regions. The alternative proposal of displaced Mycenaean chiefs who were escaping the fierce political competition on the Greek mainland (Benzi 1996) is equally unsupported by archaeological evidence which is lacking in ostentatious tombs or any other indicators of their hypothesised presence (Georgiadis 2003).

It is for these reasons that scholars like Mountjoy have favoured acculturation to explain the observed appearance of chamber tombs, arguing that local inhabitants adopted the architectural design and some iconic grave offerings – mirroring a similar process during the early Late Bronze Age when the object of emulation was Minoan culture (1998).

An intermediate position is taken by Mee (1982; 1988b) who postulates a Mycenaean presence on the islands, but is convinced of a peaceful co-existence between migrants and locals. According to Mee (1988a), the expansion in Koan and Rhodian tombs during LH IIIA2 represents a second wave of Mycenaean settlers, though Benzi (1996) believes that acculturation may explain the pattern equally satisfactorily. The reuse of tombs at Ialysos in LH IIIC is generally assumed to have been caused by an influx of refugees escaping the unsettled conditions on the Greek mainland (Mee 1988b), although some intra-island migration towards the centre may have additionally contributed to increased population at Ialysos (Benzi 1992). However, a reanalysis of funerary offerings and practices by Georgiadis has stressed the great continuity in burial traditions between the LH IIIA–B and the reused LH IIIC tombs which makes their use by an external population group less likely (2003).

Chasing the twists and turns of hypotheses and alternative hypotheses proposed by different scholars has highlighted several important points: 1) while there may be some overarching trends, each region, each island and each site has its own rhythm and patterns that need to be unravelled in order to derive a convincing interpretation; 2) given the organisation of Mycenaean power into a multitude of small kingdoms, the patterns that have emerged are a reflection of a vast network of individual relations between cities and regions, sellers and buyers, artists and craftspeople. A unified and undifferentiated Mycenaean empire did not exist. 3) A large-scale programme of strontium isotope analysis of skeletal remains is required in order to determine the geographical origin of the deceased buried in the cemeteries. Until such time, colonisation, migration and emulation all remain valid hypotheses.

CONCLUSIONS
The islands in context

So far my focus has been on understanding islands within discrete time periods. In this brief final chapter, I move away from this chronological structure to highlight key themes that weave through all of the islands' prehistory and merit a more holistic consideration. These themes are intimately connected with the islands' natural geographic features, and include seafaring and the meaning of the sea, colonisation and abandonment, regionality vs. shared cultural traits and changing island identities.

The Aegean islands are a truly fascinating area of research. During the low sea levels of the Palaeolithic, many were still safely attached to the mainland, though the Cyclades and Crete had already established their separate island identities – even if the sea crossings were considerably shorter than they are today. It is only with rising sea levels since the last Ice Age that the current extensive island world emerged. It is clear from the impressive Palaeolithic finds on Crete that humans were able to cross the sea at a very early stage; whether this achievement was deliberate or accidental is still a matter of debate. The presence of Melian obsidian found at 11th millennium BC Franchthi Cave, however, indicates that path finding, exploration and repeat visitation (and safe return journeys home) were now perfectly achievable. A further step was taken in the Mesolithic when people began to establish seasonal, and possibly also more permanent, camps on the Aegean islands to exploit locally available resources. Large-scale colonisation of the islands took place in the Neolithic when domesticated animals and cultivated plants provided a reliable and concentrated food source; further large islands were being occupied in the Early Bronze Age. Island first settled in the 2nd and 1st millennia are often smaller in area and indicate an infilling of the remaining landscape.

Against expectation, islands did not remain continuously occupied after their first colonisation. Instead, cycles of abandonment and recolonisation are the norm. Periods of abandonment may have lasted for several millennia or only for a few centuries as the examples of Kythnos and Antikythera demonstrate. Commonly used terminology, such as 'colonisation', 'settlement' and 'abandonment' over-simplify processes and events which were often more nuanced and complex. As we have seen

throughout (pre)history, an island's abandonment does not rule out visitation for raw material extraction, harvest/capture of seasonal resources or the use of the island for grazing goats. By the same token, occupation may not always imply a permanent settlement.

This book's main purpose is to illuminate the prehistory of the Aegean islands. However, it is important to recognise that these islands rarely formed a cohesive unit and most commonly splintered into smaller (sub)regional groupings. There is a great fluidity of cultural tradition zones, and island communities were able to affiliate themselves with local, regional or national scales as required. The greatest unity is apparent during heavily Minoanising or Mycenaeanising phases which created a cultural *koine* that was shared among many communities. However, these overarching trends did not eradicate more subtle cultural differences between island communities which always remained distinctly unique. At other times, unified island communities split into smaller local clusters that had common characteristics only with nearby neighbours. In the end, however, closest affinities are always with their immediate neighbours – be they other islands or adjacent coastal sites.

Wedged between the Greek mainland, Crete and the Anatolian coast, the Aegean islands have sometimes been considered passive recipients of superior cultural traditions rather than creators and powerbrokers in their own right. This is an argument commonly advanced with regard to the Minoan, Mycenaean and Anatolian cultural traditions, which, indeed, proved extremely attractive to most island communities. Nevertheless, ceramic analysis at Phylakopi and Ayia Irini, for example, has shown that the islanders made conscious choices about the nature and degree of influence they were happy to incorporate into their own traditions, and were thus active negotiators in their own fortunes – certainly at a local level. In contrast stands the Early Bronze Age when Cycladic longboats were at the heart of Aegean trade and interaction and were instrumental in bringing about a shared set of cultural traits that paid testament to the close links between Anatolia and the Cyclades, and proved to be an attractive cultural reference point also on Crete and the Greek mainland. It was also at this time that metallurgy intensified and, by virtue of the many Cycladic metal ore sources, the islanders played a major role in the extraction, processing and manufacture of copper, lead and silver objects.

With the sea central to all island communities, it is likely that it played a major role in shaping islanders' identities, although the precise nature of this human-sea interaction remains uncertain. Most cultures have a distinctly ambiguous relationship with water in general and the sea in particular because it embodies a wide range of contradictory 'emotions'. Water as a substance is transmutable, ever-changing, and often deceiving and, as such, defies human understanding (e.g. Barber 2003; Strang 2004; Vryonis 1993). When ancient and Byzantine writers perceive the sea as a positive substance, place or guide to moral behaviour, it is characterised as benevolent, calm, vitalising and cleansing. It provides a means of income through fishing or trading, encountered trials make men stronger and contact with far-away places makes them wiser. On the other hand, however, the sea has its dangerous side as it is unpredictable, changeable, treacherous, threatening, corrupting, unclean and exposes travellers to greater or lesser discomforts (Lindenlauf 2003; Vryonis 1993).

While we do not know whether the prehistoric islanders had similarly ambiguous feelings towards the sea, archaeological and iconographic evidence at the very least demonstrates the importance of this element to island communities. This is probably best demonstrated by the iconic Early Cycladic frying

pans whose function remains mysterious, but whose imagery often references boats, fish and the sea alongside fertility symbolism. An even more pronounced statement of the islanders' seafaring ethos and connection with the sea are the rock carvings at Strofilas on Andros. Dated to the Final Neolithic period, the rock carvings cover an area of 200 m^2 and depict maritime activities alongside agricultural practices and the hunting of wild animals. At least 37 ship images as well as marine creatures are depicted. Their position near a large central Hall and the presence of rock cavities for offerings seem to indicate that they formed part of a ritual ceremony that had the sea, seafaring and/or ship-building at its heart.

As ever more evidence becomes available and scholars continue to explore the islands' fascinating prehistory, one can but wonder what exciting insights might lie in store for future generations of archaeologists.

BIBLIOGRAPHY

Abramovitz, K. 1973. Frescoes from Ayia Irini, Keos, Part I. *Hesperia* 42, 284–300.

Abramovitz, K. 1980. Frescoes from Ayia Irini, Keos, Part II. *Hesperia* 49, 57–85.

Adams, P.R. and G.R. Adams. 1984. Mount Saint Helens ash fall: Evidence for disaster stress reaction. *American Psychologist* 39, 252–263

Agouridis, C. 1997. Sea routes and navigation in the third millennium Aegean. *Oxford Journal of Archaeology* 16, 1–24.

Alram-Stern, E. 1996. *Die Ägäische Frühzeit. Vol 1: Das Neolithikum in Griechenland*. Wien. Verlag der Österreichischen Akademie der Wissenschaften.

Alram-Stern, E. 2004. *Die Ägäische Frühzeit. 2. Band: Die Frühbronzezeit in Griechenland mit Ausname von Kreta*. Wien: Phoibos Verlag.

Alram-Stern, E. 2009. Kreta und die Kykladen: Zu den Außenbeziehungen Kretas während Frühminoisch IB und II. In: F. Blakolmer and J. Wilhartner (eds.) *Österreichische Forschunge zur Ägäischen Bronzezeit*. Wien: Phoibos Verlag, pp. 31–40.

Andreou, S. 2005. The landscapes of modern Greek Aegean Prehistory. In: J.F. Cherry, D. Margomenou and L.E. Talalay (eds.) *Prehistorians round the pond: Reflections on Aegean prehistory as a discipline*. Ann Arbor: Kelsey Museum of Archaeology, pp. 73–92.

Andriotis, K. 2004. Problems of island tourism development: The Greek insular regions. In: B. Bramwell (ed.) *Coastal mass tourism*. Clevedon: Channel View Publications, pp. 114–132.

Angel, J.L. 1971. *Lerna. A preclassical site in the Argolid. The people*. Princeton: American School of Classical Studies at Athens/Smithsonian Institution.

Angel, J.L. 1973. Human skeletons from grave circles at Mycenae. In: G.E. Mylonas (ed.) *O Taphikos Kyklos B ton Mykinon*. Athens: Archaeological Society of Athens, pp. 379–397.

Angelopoulou, A. 2006. The lead seal and the clay sealings. In: L. Marangou, C. Renfrew, C. Doumas and G. Gavalas (eds.) *Markiani, Amorgos: An early Bronze Age fortified settlement*. Suppl Vol 40. London: British School at Athens, pp. 219–222.

Angelopoulou, A. 2008. The 'Kastri Group': Evidence from Korfari ton Amygdalion (Panormos) Naxos, Dhaskalio Keros and Akrotiri Thera. In: N. Brodie, J. Doole, G. Gavalas and C. Renfrew (eds.) *Horizon: A colloquium on the prehistory of the Cyclades*. Cambridge: McDonald Institute for Archaeological Research, pp. 149–164.

Anthony, D.W. 1997. Prehistoric migrations as social process. In: J.C. Chapman and H. Hamerow (eds.) *Migrations and invasions in archaeological explanations* (BAR Int 666). Oxford: Archaeopress, pp. 21–32.

Arnott, R. 1996. Healing and medicine in the Aegean Bronze Age. *Journal of the Royal Society of Medicine* 89, 265–270.

Arnott, R. 1997. Surgical practice in the prehistoric Aegean. *Medizinhistorisches Journal* 32, 249–278.

Arnott, R. 1999. Healing and medicine. In: Y. Tzedakis and H. Martlew (eds.) *Minoans and Myceneaens: Flavours of their time*. Athens: Greek Ministry of Culture/National Archaeological Museum, pp. 262–279.

Arnott, R. 2002. Before Machaeon and Podalirius: Minoan and Mycenaean healers. *Cretan Studies* 7, 1–19.

Arnott, R. 2004. Disease and the prehistory of the Aegean. In: H. King (ed.) *Hygeia: Health in antiquity*. London: Routledge, pp. 12–31.

Arnott, R. (forthcoming). *Disease, healing and medicine in the Aegean Bronze Age*. Leiden: Brill.

Aslanis, I. 2008. Frühe Fortifikationssysteme in Griechenland. In: H. Erkanal, H. Hauptmann, V. Sahoglu and R. Runcel (eds.) *The Aegean in the Neolithic, Chalcolithic and the Early Bronze Age*. Ankara: Ankara University, pp. 35–43.

Asouti, S. 2003. Wood charcoal from Santorini (Thera): New evidence for climate, vegetation and timber imports in the Aegean Bronze Age. *Antiquity* 77, 471–484.

Aston, M.A. and P.G. Hardy. 1990. The Pre-Minoan landscape of Thera: A preliminary statement. In: D.A. Hardy, C.G. Doumas, J.A. Sakellarakis and P.M. Warren (eds.) *Thera and the Aegean World III. Vol. 1*. (Proceedings of the Third International Congress, Santorini, Greece, 6–9 September, 1989). London: Thera Foundation, pp. 348–360.

Åström, P. (ed.). 1987. *High, middle or low?* Gothenburg: Paul Åströms Förlag.

Atkinson, T.D. et al. 1904. *Excavations at Phylakopi in Melos*. London: Palgrave Macmillan.

Augustinos, O. 1994. *French Odysseys: Greece in French travel literature from the Renaissance to the Romantic Era*. Baltimore: Johns Hopkins University Press pp. 54–62.

Badertscher, S., A. Borsato, S. Frisia, H. Cheng, R.L. Edwards, O. Tüysüz and D. Fleitmann. 2014. Speleothems as sensitive recorders of volcanic eruptions – the Bronze Age Minoan eruption recorded in a stalagmite from Turkey. *Earth and Planetary Science Letters* 392, 58–66.

Baillie, M.G.L. 1990. Irish tree rings and an event in 1628 BC. In: D.A. Hardy, C.G. Doumas, J.A. Sakellarakis and P.M. Warren (eds.) *Thera and the Aegean World III. Vol. 3*. (Proceedings of the Third International Congress, Santorini, Greece, 6–9 September, 1989). London: Thera Foundation, pp. 160–166.

Baillie, M.G.L. 2013. Radical thinking on the Thera debate. In: H. Meller (ed.) 1600- cultural change in the shadow of the Thera-Eruption? Halle: Landesmuseum für Vorgeschichte, pp. 65–75.

Baillie, M.G.L. and M.A.R. Munro. 1988. Irish tree rings, Santorini and volcanic dust veils. *Nature* 332, 344–346.

Barber, I. 2003. Sea, land and fish: Spatial relationships and the archaeology of South Island Maori fishing. *World Archaeology* 35, 434–448.

Barber, I. 2007. The Middle Cycladic pottery. In: C. Renfrew et al. (eds.) *Excavations at Phylakopi in Melos, 1974–77*. Suppl. Vol No. 42. London: British School at Athens, pp. 181–238.

Barber, R.L.N. 1987. *The Cyclades in the Bronze Age*. London: Duckworth.

Barber, R.L.N. 1999. Hostile Mycenaeans in the Cyclades? In: R. Laffineur (ed.) *Polemos: Le Contexte Guerrier en Égée à l'Âge du Bronze.* (Aegaeum 19). Liège: Université de Liège, pp. 133–138.

Barber, R.L.N. 2010a. Cyclades – Middle Bronze Age. In: E. Cline (ed.) *The Oxford handbook of the Bronze Age Aegean*. Oxford: Oxford University Press, pp. 126–137.

Barber, R.L.N. 2010b. Cyclades – Late Bronze Age. In: E. Cline (ed.) *The Oxford handbook of the Bronze Age Aegean*. Oxford: Oxford University Press, pp. 160–170.

Barber, R.L.N. and O. Hadjianastasiou. 1989. Mikre Vigla: A Bronze Age settlement on Naxos. *Annual of the British School at Athens* 84, 63–162.

Barker, G. 1996. Regional archaeological projects. *Archaeological Dialogues* 3, 160–175.

Bass, G.F. 1967. *Cape Gelidonya: A Bronze Age shipwreck*. TAPA 57. Philadelphia: Philadelphia University Press.

Baum, A. 1987. Toxins, technology, and natural disasters. In: Gary R. VandenBos and Brenda K. Bryant (eds.) *Cataclysms, crises, and catastrophes: Psychology in action*. Washington, DC: American Psychological Association, pp. 5–49.

Baum, T. 1997. The fascination of islands: A tourist perspective. In: D.G. Lockhart and D. Drakakis-Smith (eds.) *Island tourism: Trends and prospects*. London/New York: Pinter, pp. 21–35.

Baurain, C. 1991. Minos et la Thalassocratie Minoenne: Réflexions Historiographiques sur la Naissance d'un Mythe. In: R. Laffineur and L. Basch (eds.) *Thalassa. L'Egéen Prehistorique et la Mer: Actes de la troisième Rencontre égéenne internationale de l'Université de Liège, Station de recherches sous-marines et océanographiques (StaReSO), Calvi, Corse (23–25 avril 1990)*. Liège: Université de Liège, pp. 263–266.

Bednarik, R.G. 1999. Maritime navigation in the Lower and Middle Palaeolithic. *Comptes Rendus de l'Académie des Sciences-Series IIA-Earth and Planetary Science* 328(8), 559–563.

Begemann, F., S. Schmitt-Strecker and E. Pernicka. 2003. On the composition and provenance of metal finds from Besiktepe (Troia). In: G.A. Wagner, E. Pernicka and H.-P. Uerpmann (eds.) *Troia and the Troad – Scientific approaches*. Heidelberg: Springer, pp. 173–201.

Bennett, S.M. and G.A. Owens. 1999. The dating of the Linear A inscriptions from Thera. *Kadmos* 38, 12–18.

Bent, J.T. 2002 [1885]. *The Cyclades or life among the insular Greeks*. Oxford: Archaeopress.

Bent, J.T. and J.G. Garson. 1884. Researches among the Cyclades. *The Journal of Hellenic Studies* 5, 42–59.

Bent, M.V.A. 2006 [1885–1889]. *The travel Chronicles of Mrs J. Theodore Bent: Greece and the Levantine Littoral*. Vol. 1. Oxford: Archaeopress.

Benzi, M. 1984. Evidence for a MM settlement at Ialysos. In: R. Hägg and N. Marinatos (eds.) *The Minoan thalassocracy: Myth and reality*. (Proceedings of the Third International Symposium at the Swedish Institute in Athens, 31 May–5 June, 1982, Skrifter Utgivna av Svenska Institutet i Athen). Stockholm: Svenska Institutet i Athen, pp. 93–104.

Benzi, M. 1988a. Mycenaean Rhodes: A summary. In: S. Dietz (ed.) *Archaeology in the Dodecanese*. Copenhagen: The National Museum of Denmark, pp. 59–72.

Benzi, M. 1988b. Rhodes in the LH IIIC period. In: E.B. French and K.A. Wardle (eds.) *Problems in Greek prehistory. Papers presented at the centenary conference of the British School at Athens, Manchester April 1986*. Bristol: Bristol Classical Press, pp. 253–262.

Benzi, M. 1992. *Rodi e la Civilitá Micenea*. Rome: Scuola Archaeologica Italinana di Atene.

Benzi, M. 1993. The Late Bronze Age pottery from Vathy Cave, Kalymnos. In: C. Zerner and J. Winder (eds.) *Wace and Blegen: Pottery as evidence for trade in the Aegean Bronze Age 1939-1989*. (Proceedings of the International Conference Held at the American School of Classical Studies at Athens, December 2–3, 1989). Amsterdam: Gieben, pp. 275–288.

Benzi, M. 1996. Problems of the Mycenaean expansion in the south-eastern Aegean. In: E. De Miro, L. Godart and A. Sacconi (eds.) *Atti e memorie del secondo congress internazionale di Micenologia*, Roma-Napoli, 14–10 Ottobre 1991. Vol. 3. Rome: Gruppo Editoriale Internazionale, pp. 947–978.

Berg, I., 1999. The Southern Aegean system. *Journal of World Systems Research* 5, 475–484.

Berg, I. 2000. The Minoanisation of the Southern Aegean. Unpublished PhD thesis. University of Cambridge.

Berg, I. 2007a. *Negotiating island identities: The active use of pottery in the middle and late Bronze Age Cyclades*. New York: Gorgias Press.

Berg, I. 2007b. Aegean Bronze Age seascapes – A case study in maritime movement, contact and interaction. In: S. Antoniadou and A. Pace (eds.) *Mediterranean crossroads*. Athens: Pierides Foundation, pp. 387–415.

Berg, I. 2013. Marine creatures and the sea in Bronze Age Greece: Ambiguities of meaning. *Journal of Maritime Archaeology* 8, 1–27.

Betancourt, P.P. 2006. *The Chrysokamino metallurgy workshop and its territory* (Hesperia Suppl. 36). Athens: American School of Classical Studies.

Betancourt, P.P. 2008. The cemetery of Hagia Photia, Crete. In: N. Brodie, J. Doole, G. Gavalas and C. Renfrew (eds.) *Horizon: A colloquium on the prehistory of the Cyclades*. Cambridge: McDonald Institute for Archaeological Research, pp. 237–240.

Betancourt, P.P. and E.S. Banou. 1991. Pseira and Minoan sea-trade. In: R. Laffineur and L. Basch (eds.) *Thalassa. L'Egéen Prehistorique et la Mer* (Aegaeum 7). Liège: Université de Liège, pp. 107–110.

Bevan, A. and J. Conolly. 2013. *Mediterranean islands, fragile communities and persistent landscapes: Antikythera in long-term perspective*. Cambridge: Cambridge University Press.

Bicknell, P. 2000. Late Minoan IB Marine Ware, the marine environment of the Aegean, and the Bronze Age eruption of the Thera volcano. *Geological Society, London, Special Publications* 171(1), 95–103.

Bietak, M. 1995. Connections between Egypt and the Minoan world: New results from Tell el-Dab[c]a/Avaris. In: W.V. Davies and L. Schofield (eds.) *Egypt, the Aegean and the Levant: Interconnections in the Second Millennium BC*. London. British Museum Publications, pp. 19–28.

Bikaki, A.H. 1984. *Keos IV: Ayia Irini. The potter's marks*. Mainz: Philipp von Zabern.

Bintliff, J.L. 1977. *Natural environment and human settlement in prehistoric Greece* (BAR Suppl. Series 28). Oxford: British Archaeological Reports.

Birtacha et al. 2008. 'Cooking' installations in LC IA Akrotiri on Thera: A preliminary study of the 'Kitchen' in Pillar Shaft 65. In: N. Brodie, J. Doole, G. Gavalas and C. Renfrew (eds.) *Horizon: A colloquium on the prehistory of the Cyclades*. Cambridge: McDonald Institute for Archaeological Research, pp. 349–376.

Bisel, S. 1992. The human skeletal remains. In: W.A. McDonald and N.C. Wilkie (eds.) *Excavations at Nichoria in southwest Greece. Vol II: The Bronze Age occupation*. Minneapolis: University of Minnesota Press, pp. 345–358.

Bisel, S. and J.L. Angel. 1985. Health and nutrition in Mycenaean Greece: A study in human skeletal remains. In: N.C. Wilkie and W.D.E. Coulson (eds.) *Contributions to Aegean archaeology. Studies in honor of William A. McDonald*. Minneapolis: University of Minnesota Press, pp. 197–209.

Black, J. 1985. *The British and the Grand Tour*. London: Croom Helm.

Blackwell, N.G. 2011. Middle and Late Bronze Age metal tools from the Aegean, Eastern Mediterranean, and Anatolia: Implications for cultural/regional interaction and craftsmanship. Unpublished PhD thesis. Bryn Mawr College.

Blomqvist, B. 1990. Cycladic figurines. *Opuscula Atheniensia* XVIII: 239–241.

Bodnar, E. and C. Foss. 2004. *Cyriac of Ancona: Later travels* (edited and translated). Cambridge, MA: Harvard University Press.

Bohnhoff, M., M. Rische, T. Meier, D. Becker, G. Stavrakakis, and H.-P. Harjes. 2006. Microseismic activity in the Hellenic Volcanic Arc, Greece, with emphasis on the seismotectonic setting of the Santorini-Amorgos zone. *Tectonophysics* 423, 17–33.

Bosanquet, R.C. 1904a. The wall-paintings. In: T.D. Atkinson et al. (eds.) *Excavations at Phylakopi in Melos*. London: Palgrave Macmillan, pp. 70–79.

Bosanquet, R.C. 1904b. The obsidian trade. In: T.D. Atkinson et al. (eds.) *Excavations at Phylakopi in Melos*. London: Palgrave Macmillan, pp. 216–233.

Bottema, S. 2003. The vegetation history of the Greek Mesolithic. In: N. Galanidou and C. Perlès (eds.) *The Greek Mesolithic: Problems and perspectives*. British School at Athens Studies 10. London: The British School at Athens, pp. 33–49.

Boulotis, C. 1998. Les nouveaux documents en linéare A d'Akrotiri, (Théra). Remarques préliminaires. *Bulletin de Correspondance Hellénique* 122, 407–411.

Boulotis, C. 2009. Koukonisi on Lemnos: Reflections on the Minoan and Minoanising evidence. In: C.F. Macdonald, E. Hallager and W.-D. Niemeier (eds.) *The Minoans in the central, eastern and northern Aegean – New evidence* (Monographs of the Danish Institute at Athens 8). Arhus: Aarhus University Press, pp. 175–218.

Branigan, K. 1974. Aegean metalwork of the Early and Middle Bronze Age. Oxford: Clarendon Press.

Branigan, K. 1981. Minoan colonialism. *Annual of the British School at Athens* 76, 23–33.

Branigan, K. 1984. Minoan community colonies in the Aegean? In: R. Hägg and N. Marinatos (eds.) *The Minoan thalassocracy: Myth and reality*. (Proceedings of the Third International Symposium at the Swedish Institute in Athens, 31 May–5 June, 1982, Skrifter Utgivna av Svenska Institutet i Athen. 4). Stockholm: Svenska Institutet i Athen, pp. 49–53.

Braudel, F. 1972. *The Mediterranean and the Mediterranean world in the age of Philip II* (S. Reynolds, trans.). London: Harper Collins.

Brendon, P. 1991. *Thomas Cook: 150 years of popular tourism*. London: Secker & Warburg.

Brodie, N. 2009. A reassessment of Mackenzie's second and third cities at Phylakopi. *Annual of the British School at Athens* 104, 49–72.
Brodie, N., J. Doole and P. Watson (eds.). 2000. *Stealing history: The illicit trade in cultural material*. Cambridge: McDonald Institute for Archaeological Research.
Brodie, N. and C. Renfrew. 2005. Looting and the world's archaeological heritage: The inadequate response. *Annual Review of Anthropology* 34, 343–361.
Brogan, T.M. 2013. 'Minding the gap': Re-examining the early Cycladic III 'gap' from the perspective of Crete: A regional approach to relative chronology, networks and complexity in the late Prepalatial period. *American Journal of Archaeology* 117, 555–567.
Bronk Ramsey, Christopher. 2008. Radiocarbon dating: Revolutions in understanding. *Archaeometry* 50, 249–275.
Broodbank, C. 1999. Kythera survey: Preliminary report on the 1998 season. *Annual of the British School at Athens* 94, 191–214.
Broodbank, C. 2000a. *An island archaeology of the Early Cyclades*. Cambridge: Cambridge University Press.
Broodbank, C. 2000b. Perspectives on an Early Bronze Age island centre: An analysis of pottery from Daskaleio-Kavos (Keros) in the Cyclades. *Oxford Journal of Archaeology* 19, 323–342.
Broodbank, C. 2004. Minoanisation. *Proceedings of the Cambridge Philological Society* 50, 46–93.
Broodbank, C. 2006. The origins and early development of Mediterranean maritime activity. *Journal of Mediterranean Archaeology* 19, 199–230.
Broodbank, C. 2007. The pottery. In: C. Renfrew, C. Doumas, L. Marangou and G. Gavalas (eds.) *Keros, Dhaskalio Kavos. The investigations of 1987–88*. Cambridge: McDonald Institute for Archaeological Research, pp. 115–264.
Broodbank, C. 2013. 'Minding the Gap'. Thinking about change in Early Cycladic island societies from a comparative perspective. *American Journal of Archaeology* 117, 535–543.
Broodbank, C. and E. Kiriatzi. 2007. The first 'Minoans' of Kythera revisited: Technology, demography, and landscape in the Prepalatial Aegean. *American Journal of Archaeology* 111, 241–274.
Broodbank, C., E. Kiriatzi and J. Rutter. 2005. From pharaoh's feet to the slave-women of Pylos? The history and cultural dynamics of Kythera in the Third Palace period. In: A. Dakouri-Hild and S. Sherratt (eds.) *Autochthon. Papers presented to O.T.P.K. Dickinson on the occasion of his retirement*. BAR International Series 1432. Oxford: Archaeopress, pp. 70–96.
Broodbank, C. and T.F. Strasser. 1991. Migrant farmers and the Neolithic: Colonization of Crete. *Antiquity* 65, 233–245.
Bruins, H.J., J.A. MacGillivray, C.E. Synolakis, C. Benjamini, J. Keller, H.J. Kisch, A. Kügel and J. van der Plicht. 2008. Geoarchaeological tsunami deposits at Palaikastro (Crete) and the Late Minoan IA eruption of Santorini. *Journal of Archaeological Science* 35, 191–212.
Bruins, H.J. and J. van der Plicht. 2014. The Thera olive branch, Akrotiri (Thera) and Palaikastro (Crete): Comparing radiocarbon results of the Santorini eruption. *Antiquity* 88 (339), 282–287.
Bruins, H.J., J. van der Plicht and J.A. MacGillivray. 2009. Minoan Santorini eruption and tsunami deposits in Palaikastro (Crete): Dating by geology, archaeology, ^{14}C, and Egyptian chronology. *Radiocarbon* 51, 397–411.
Buhalis, D. 1999. Tourism on the Greek islands: Issues of peripherality, competitiveness and development. *The International Journal of Tourism Research* 1, 341–358.
Buhalis, D. 2001. Tourism in Greece: Strategic analysis and challenges. *Current Issues in Tourism* 4, 440–480.
Buondelmonti, C. 1824 [1420]. *Librum Insularum Archipelagi* (with annotations by L. de Sinner). Berlin: Reimer.
Bush, H. and M. Zvelebil. 1991. Pathology and health in past societies: An introduction. In: H. Bush and M. Zvelebil (eds.) *Health in past societies* (BAR International Series 567) Oxford: British Archaeological Reports, pp. 3–9.
Buttler, W. 1935/36. Vorgeschichtliches in der Stadt Samos: Nachträge. *Mitteilungen des Deutschen Archäologischen Instituts* 60/61, 184–200.
Carr, H.G. 1960. Some dental characteristics of the Middle Minoans. *Man* 60, 119–122.

Carter, T. 2004. Mochlos and Melos: A special relationship? Creating identity and status in Minoan Crete. In: L.P. Day, M.S. Mook and J.D. Muhly (eds.) *Crete beyond the palaces*. Prehistoric Monographs 10. Philadelphia: INSTAP Academic Press, pp. 290–307.

Caskey, J.L. 1962–1972. Excavations in Keos. *Hesperia* 31–41.

Caskey, J.L. 1969. Crises in the Minoan-Mycenaean world. *Proceedings of the American Philosophical Society* 113, 433–449.

Caskey, M.E. 1984. The temple at Ayia Irini, Kea: Evidence for the Late Helladic IIIC phases. In: J.A. MacGillivray and R.L.N. Barber (eds.) *The prehistoric Cyclades*. Edinburgh: University of Edinburgh, pp. 241–254.

Caskey, M.E. 1986. *Keos II: The temple at Ayia Irini. Part I: The Statues*. Mainz: Philipp von Zabern.

Caskey, M.E. 1998. Ayia Irini: Temple studies. In: L.G. Mendoni and A.J. Mazarakis Ainian (eds.) *Kea-Kythnos: History and archaeology*. Athens: Research Centre for Greek and Roman Antiquity, pp. 123–138.

Casson, L. 1971. *Ships and seamanship in the ancient world*. Baltimore: John Hopkins University Press.

Catapotis, M. 2007. On the spatial organization of copper smelting activities in the Southern Aegean during the Early Bronze Age. In: R.C.P. Doonan and P.M. Day (eds.) *Metallurgy in the Early Bronze Age Aegean*. Oxford: Oxbow Books, pp. 207–223.

Catapotis, M. and Y. Bassiakos. 2007. Copper smelting at the Early Minoan site of Chrysokamino on Crete. In: R.C.P. Doonan and P.M. Day (eds.) *Metallurgy in the Early Bronze Age Aegean*. Oxford: Oxbow Books, pp. 68–83.

Cavanagh, W. and C. Mee. 1998. *A private place: Death in prehistoric Greece* (SIMA 125). Aströms. Jonsered.

Chateaubriand, F.A. de. 1814. *Travels in Greece, Palestine, Egypt and Barbary, during the Years 1806 and 1807* (Frederic Shoberl, trans.). New York: Van Winkle and Wiley.

Cherry, J.F. 1981. Pattern and process in the earliest colonization of the Mediterranean islands. *Proceedings of the Prehistoric Society* 47, 41–68.

Cherry, J.F. 1987. Island origins: The early prehistoric Cyclades. In: B. Cunliffe (ed.) *Origins*. London: BBC Books, pp. 16–29.

Cherry, J.F. 1990. The first colonization of the Mediterranean islands: A review of recent research. *Journal of Mediterranean Archaeology* 3, 145–221.

Cherry, J.F. 2003. Archaeology beyond the site: Regional survey and its future. In: J.K. Papadopoulos and R.M. Leventhal (eds.) *Theory and practice in Mediterranean archaeology: Old World and New World perspectives*. University of California, Los Angeles: Cotsen Institute of Archaeology, UCLA, pp. 137–159.

Cherry, J.F. and J.L. Davis. 1982. The Cyclades and the Greek Mainland in LC I: The evidence of pottery. *American Journal of Archaeology* 86, 333–341.

Cherry, J.F., J.L. Davis and E. Mantzourani. 1991. *Landscape archaeology as long-term history: Northern Keos in the Cycladic islands from the earliest settlement until modern times*. Los Angeles: UCLA Institute of Archaeology.

Cherry, J.F. and L.E. Talalay. 2005. 'Just the facts, Ma'am': Surveying Aegean prehistory's state of health. In: J.F. Cherry, D. Margomenou and L.E. Talalay (eds.) *Prehistorians round the pond: Reflections on Aegean prehistory as a discipline*. Ann Arbor: Kelsey Museum of Archaeology, pp. 23–42.

Chippendale, C. and D.W.J. Gill. 2000. Material consequences of contemporary classical collecting. *American Journal of Archaeology* 104, 463–511.

Choiseul-Gouffier, M.G.A.F. Comte de. 1783. *Voyage Pittoresque de la Grèce. 4 vols*. Paris: Blaise.

Choleva, M. 2012. The first wheelmade pottery at Lerna: Wheel-thrown or wheel-fashioned? *Hesperia* 81, 343–381.

Cita, M.B., A. Camerlenghi and B. Rimoldi. 1996. Deep-sea tsunami deposits in the eastern Mediterranean: New evidence and depositional models. *Sedimentary Geology* 104, 155–173.

Cita, M.B. and B. Rimoldi. 1997. Geological and geophysical evidence for a Holocene tsunami deposit in the eastern Mediterranean deep-sea record. *Journal of Geodynamics* 24, 293–304.

Clark, J.T. and J. Terrell. 1978. Archaeology in Oceania. *Annual Review of Anthropology* 7, 293–319.

Cline, E. 2010. *The Oxford handbook of the Bronze Age Aegean*. Oxford: Oxford University Press.

Coccossis, H. and M.E. Constantoglou. 2005. The need of spatial typologies in tourism planning and policy making: The Greek case. (Proceedings of the 45th Congress of the European Regional Science Association). Amsterdam Vrije University, pp. 1–20.

Coldstream, J.N. and G.L. Huxley. 1972. *Kythera: Excavations and studies*. London: Faber.

Coleman, J.E. 1977. Keos I: *Kephala. A Late Neolithic settlement and cemetery*. Princeton: American School of Classical Studies.

Coleman, J.E. 1985. 'Frying pans' of the Early Bronze Age Aegean. *American Journal of Archaeology* 89, 191–219.

Coleman, K. 1973. Frescoes from Ayia Irini, Keos. Part I. *Hesperia* 42, 284–300.

Colledge, S., J. Conolly and S. Shennan. 2004. Archaeobotanical evidence for the spread of farming in the Eastern Mediterranean. *Current Anthropology* 45. Suppl, S35–S47.

Cosmopoulos, M.B. 1998. Reconstructing Cycladic prehistory: Naxos in the Early and Middle Late Bronze Age. *Oxford Journal of Archaeology* 17, 127–148.

Cullen, T. 1995. Mesolithic mortuary ritual in Franchthi Cave, Greece. *American Journal of Archaeology* 69, 270–289.

Cultraro, M. 2005. Aegeans on smoke-shrouded Lemnos: A re-assessment of the Mycenaean evidence from Poliochni and other sites. In: R. Laffineur and E. Greco (eds.) *Emporia: Aegeans in the Central Mediterranean* (Aegaeum 25). Liège: Université de Liège, pp. 237–246.

Cultraro, M. 2006. Islands out of time: Richness and diversity of prehistoric studies on the Northern Aegean. In: P. Darcque, M. Fotiadis and O. Polychronopoulou (eds.) *Mythos: La préhistoire égéenne du XIXe au XXIe siècle après J.-C.* (BCH Supplement 46). Athens: Ecole Française d'Athènes, pp. 279–290.

Cummer, W.W. and E. Schofield. 1984. *Keos III. Ayia Irini: House A*. Mainz: von Zabern.

Cunningham, T. and J. Driessen. 2004. Site by site: Combining survey and excavation data to chart patterns of socio-political change in Bronze Age Crete. In: S.E. Alcock and J.F. Cherry (eds.) *Side-by-side survey: Comparative regional studies in the Mediterranean world*. Oxford: Oxbow, pp. 101–113.

Cutler, J.E. 2016. Fashioning identity: Weaving technology, dress and cultural change in the Middle and Late Bronze Age southern Aegean. In: E. Gorogianni, P. Pavuk and L. Girella (eds.) *Beyond Thalassocracies*. Oxford: Oxbow Book, pp. 172–185.

Darwin, C. 1859. *On the origin of species by means of natural selection*. London: John Murray.

Davaras, C. and P.P. Betancourt. 2004. *The Hagia Photia cemetery I: The tomb groups and architecture*. Philadelphia: INSTAP Academic Press.

Davidson, D.A. 1978. Aegean soils during the second millennium B.C. with reference to Thera. In: C.G. Doumas (ed.) *Thera and the Aegean world. Papers Presented at the Second International Scientific Congress, Santorini, Greece, August 1978*. London: Thera Foundation, pp. 725–739.

Davidson, D.A. 1980. Erosion in Greece during the first and second millennia BC. In: R.A. Cullingford, D.A. Davidson and J. Lewin (eds.) *Timescales in geomorphology*. New York: Wiley & Sons, pp. 143–158.

Davies, S. and Davis, J.L. 2007. *Between Venice and Istanbul. Colonial landscapes in early modern Greece*. Athens: American School of Classical Studies.

Davis, E. 1990. The Cycladic style of the Thera frescoes. In: D.A. Hardy et al. (eds.) *Thera and the Aegean World III. Proceedings of the Third International Congress, Santorini, Greece, 6–9 September, 1989*. London: Thera Foundation, pp. 214–227.

Davis, J.L. 1979. Minos and Dexithea: Crete and the Cyclades in the later Bronze Age. In: J.L. Davis and J.F. Cherry (eds.) *Papers in Cycladic prehistory*. Los Angeles: Institute of Archaeology, pp. 143–157.

Davis, J.L. 1986. *Keos V. Ayia Irini: Period V*. Mainz: von Zabern.

Davis, J.L. 1992. Review of Aegean prehistory I: The islands of the Aegean. *American Journal of Archaeology* 96, 699–756.

Davis, J.L. and J.F. Cherry. 2007. The Cycladic pottery from Late Bronze I levels. In: C. Renfrew, with N. Brodie, C. Morris and C. Scarre (eds.) *Excavations at Phylakopi in Melos 1974–77* (BSA Supplementary Volume 42), pp. 265–306. London: British School at Athens.

Davis, J.L. and E. Gorogianni. 2008. Potsherds from the edge: Defining the limits of Minoanized areas of the Aegean. In: N. Brodie, J. Doole, G. Gavalas and C. Renfrew (eds.) *Horizon: A colloquium on the prehistory of the Cyclades*. Cambridge: McDonald Institute for Archaeological Research, pp. 379–388.

Davis, J.L., I. Tzonou-Herbst and A.D. Wolpert. 2001. Addendum: 1992–1999. In: T. Cullen (ed.) *Aegean prehistory: A review*. Boston: Archaeological Institute of America, pp. 77–94.

Davis, J.L. et al. 1983. Keos and the eastern Aegean: The Cretan connection. *Hesperia* 52, 361–366.

Dawkins, R.M. and J.P. Droop. 1910/11. Excavations at Phylakopi in Melos, 1911. *Annual of the British School at Athens* 17, 1–22.

Dawson, H.S. 2004–6. Understanding colonisation: Adaptation strategies in the central Mediterranean islands. *Accordia Research Papers* 10, 35–60.

Dawson, H.S. 2010. A question of life or death? Seafaring and abandonment in the Mediterranean and Pacific islands. In: A. Anderson and K.V. Boyle (eds.) *The global origins and development of seafaring*. Cambridge: McDonald Institute for Archaeological Research, pp. 203–212.

Dawson, H.S. 2014. *Mediterranean voyages: The archaeology of island colonisation and abandonment*. Vol. 62. New York: Left Coast Press.

Day, P.M., C.G. Doumas, H. Erkanal, V. Kilikoglou, O. Kouka, M. Relaki and V. Sahoglu. 2009. New light on the ‘Kastri Group’: A petrographic and chemical investigation of ceramics from Liman Tepe and Bakla Tepe. *Arkeometri Sonuclari Toplantisi* 24, 335–346.

Day, P.M., D.E. Wilson, and E. Kiriatzi. 1997. Reassessing specialization in Prepalatial Cretan ceramic production. In: R. Laffineur and P.P. Betancourt (eds.) *TEXNH: Craftsmen, Craftswomen and Craftsmenship in the Aegean Bronze Age*. *Proceedings of the 6th International Aegean Conference Philadelphia, Temple University, 18–21 April 1996*. Liège and Austin: Université de Liège/University of Texas at Austin, pp. 275–289.

De Vere Stacpool, H. 1908. *The blue lagoon*. London: T. Fisher Unwin.

Defoe, D. 1719 (modern edition 1983). *The life and strange surprising adventures of Robinson Cruesoe of York, Mariner*. Oxford: Oxford University Press.

Deger-Jalkotzy, S. 2006. Late Mycenaean warrior tombs. In: S. Deger-Jalkotzy and I.S. Lemos (eds.) *Ancient Greece: From the Mycenaean palaces to the age of Homer* (Edinburgh Leventis Studies 3). Edinburgh: Edinburgh University Press, pp. 151–179.

Deger-Jalkotzy, S. 2008. Decline, destruction, aftermath. In: Shelmerdine (ed.) *The Cambridge companion to the Aegean Bronze Age*. Cambridge. Cambridge University Press, pp. 387–415.

Della Seta, A. 1933. Atti della Scuola: 1930–31. *Annuario della Scuola Archeologica di Atene* 13–14, 499–509.

Demoule, J.-P. and C. Perlès. 1993. The Greek Neolithic: A new review. *Journal of World Prehistory* 7, 355–416.

Denton, J.S. and N.J.G. Pearce. 2008. Comment on ‘A synchronized dating of three Greenland ice cores throughout the Holocene’ by B.M. Vinther et al.: No Minoan tephra in the 1642 B.C. layer of the GRIP ice core. *Journal of Geophysical Research* 113, D4, 1–7.

Desborough, V.R. 1972. *The Greek Dark Ages*. London. Benn.

Devetzi, T.D. 1990. The stone industry at Akrotiri: A theoretical approach. In: D.A. Hardy et al. (eds.) *Thera and the Aegean World III*. *Proceedings of the Third International Congress, Santorini, Greece, 6–9 September, 1989*. London: Thera Foundation, pp. 19–23.

Diamond, J.M. and R.M. May. 1981. Island biogeography and the design of natural reserves. In: R.M. May (ed.) *Theoretical ecology*. Oxford: Blackwell, pp. 228–252.

Díaz-Andreu, M. 2007. *A world history of nineteenth-century archaeology*. Oxford. Oxford University Press.

Dickinson, O. 1994. *The Aegean Bronze Age*. Cambridge: Cambridge University Press.

Dickinson, O. 2006. *The Aegean from Bronze Age to Iron Age*. Routledge. London.

Dietz, S. 1984. *Lindos IV, 1: Excavations and surveys in Southern Rhodes: The Mycenaean period*. Copenhagen: The National Museum of Denmark.

Dimitriadis, I.M., D.G. Panagiotopoulos, C.B. Papazachos, P.M. Hatzidimitrious, E.E. Karagianni and I. Kane. 2005. Recent seismic activity (1994–2002) of the Santorini volcano using data from local seismological

network. In: M. Fytikas and G.E. Vougioukalakis (eds.) *The South Aegean Active Volcanic Arc* (Developments in Volcanology no 7). Amsterdam: Elsevier, pp. 185–203.

Dominey-Howes, D. 2002. Documentary and geological records of tsunamis in the Aegean Sea region of Greece and their potential value to risk assessment and disaster management. *Natural Hazards* 25, 195–224.

Dominey-Howes, D.T.M., Papadopoulos, G.A. and A.G. Dawson. 2000. Geological and historical investigation of the 1650 Mt. Columbo (Thera Island) eruption and tsunami, Aegean Sea, Greece. *Natural Hazards* 21, 83–96.

Doonan, R.C.P. and P.M. Day. 2007. Mixed origins and the origins of mixing: Alloys and provenance in the Early Bronze Age Aegean. In: R.C.P. Doonan and P.M. Day (eds.) *Metallurgy in the Early Bronze Age Aegean*. Oxford: Oxbow Books, pp. 1–18.

Doonan, R.C.P., P.M. Day and N. Dimopoulou-Rethemiotaki. 2007. Lame excuses for emerging complexity in Early Bronze Age Crete: The metallurgical finds from Poros Katsambas and their context. In: R.C.P. Doonan and P.M. Day (eds.) *Metallurgy in the Early Bronze Age Aegean*. Oxford: Oxbow Books, pp. 98–122.

Doumas, C.G. 1964. Kyklades: Keros, Naxos. *Archaiologikon Deltion* 19, 409–412.

Doumas, C.G. 1967. Le incisioni rupestri di Nasso, nelle Cicladi, *Bollettino del Centro Camuno di Studi Preistorici* 3, 111–132.

Doumas, C.G. 1977. *Early Bronze Age burial habits in the Cyclades* (SIMA 48). Göteborg: Paul Åströms Förlag.

Doumas, C.G. (ed.). 1978–1980. *Thera and the Aegean world. Papers presented at the second international scientific congress, Santorini, Greece, August 1978*. London: Thera Foundation.

Doumas, C.G. 1983. *Thera: Pompeii of the ancient Aegean: Excavations at Akrotiri 1967–79*. London: Thames & Hudson.

Doumas, C.G. 1988. EBA in the Cyclades: Continuity or discontinuity. In: E.B. French and K.A. Wardle (eds.) *Problems in Greek prehistory. Papers presented at the Centenary Conference of the British School at Athens, Manchester, April 1986*. Bristol: Bristol Classical Press, pp. 21–29.

Doumas, C.G. (ed.). 1992a. *Akrotiri Theras: eikosi chronia ereunas (1967–1987): Symperasmata – provlemata – prooptikes*. Athens. Archaeological Society at Athens.

Doumas, C.G. 1992b. *The wall paintings of Thera*. Athens: Thera Foundation Petros M. Nomikos.

Doumas, C.G. 2002. *Silent witness: Early Cycladic art in the 3rd mill. BC*. New York: Onassis Foundation.

Doumas, C.G. 2008. Chambers of mystery. In: N. Brodie, J. Doole, G. Gavalas and C. Renfrew (eds.) *Horizon: A colloquium on the prehistory of the Cyclades*. Cambridge: McDonald Institute for Archaeological Research, pp. 165–175.

Doumas, C.G. 2010. Akrotiri. In: E. Cline (ed.) *Oxford handbook of the Bronze Age Aegean*. Oxford: Oxford University Press, pp. 752–761.

Doumas, C.G. 2011. Searching for the Early Bronze Age Aegean metallurgist's toolkit. In: P.P. Betancourt and S.C. Ferrence (eds.) *Metallurgy: Understanding how, learning why: Studies in Honor of James D. Muhly*. Philadelphia: INSTAP Academic Press, pp. 165–179.

Doumas, C.G. 2013. Managing the archaeological heritage: the case of Akrotiri, Thera, (Santorini). *Conservation and Management of Archaeological Sites* 15, 109–120.

Drews, R. 1993. *The end of the Bronze Age: Changes in warfare and the catastrophe ca. 1200 BC*. Princeton: Princeton University Press.

Driessen, J. 2001. History and hierarchy: Preliminary observations on the settlement pattern of Minoan Crete. In: K. Branigan (ed.) *Urbanism in the Aegean Bronze Age*. Sheffield: Sheffield Academic Press, pp. 51–71.

Driessen, J. and C.F. Macdonald. 1997. *The troubled island: Minoan Crete before and after the Santorini eruption*. Austin: University of Texas at Austin.

Driessen, J. and C.F. Macdonald. 2000. The eruption of the Santorini volcano and its effects on Minoan Crete. *Geological Society, London, Special Publications* 171(1), 81–93.

Dritsakis, N. 2004. Cointegration analysis of German and British tourism demand for Greece, *Tourism Management* 25, 111–119.

Druitt, T.H., L. Edwards, R.M. Mellors, D.M. Pyle, R.S.J. Sparks, M. Lanphere, M. Davies and B. Barriero. 1999. *Santorini volcano* (Special Memoir 19). London: Geological Society.

Economidis, P.S. 2000. The 'Little Fisherman' and the fish he holds. In: S. Sherratt (ed.) *The wall paintings of Thera. Proceedings of the First International Symposium, 30 August–4 September 1997, P.M. Nomikos Conference Centre Thera, Hellas, 2*. Athens: Thera Foundation, pp. 555–560.

Efstratiou, N. 1985. *Ayios Petros: A Neolithic site in the Northern Sporades* (BAR International Series 241). Oxford: British Archaeological Reports.

Efstratiou, N. 2005. Tracing the story of the first farmers in Greece – A long and winding road. In: C. Lichter (ed.) *How did farming reach Europe?* Istanbul: Deutsches Archäologisches Institut, pp. 143–154.

Efstratiou, N. 2008. The Neolithic of the Aegean islands: A new picture emerging. In: H. Erkanal, H. Hauptmann, V. Sahoglu and Riza Tuncel (eds.) *The Aegean in the Neolithic, Chalcolithic and the Early Bronze Age*. Ankara: Ankara University, pp. 159–163.

Efstratiou, N. et al. 2004. The Neolithic settlement of Knossos: New light on an old picture. In: G. Cadogan, E. Hatzaki and A. Vasilakis (eds.) *Knossos: palace, city, state*. London: British School at Athens, pp. 39–49.

Eisner, R. 1993. *Travelers to an antique land: The history and literature of travel to Greece*. Ann Arbor: University of Michigan Press.

Ekschmitt, W. 1986. *Kunst und Kultur der Kykladen I: Neolithikum und Bronzezeit*. Mainz. von Zabern.

Elefanti, P., G. Marshall and C. Gamble. 2015. The prehistoric stones of Greece: A resource from field survey. Archaeological Data Service. http://archaeologydataservice.ac.uk/archives/view/stones_ahrb_2013/index.cfm

Elia, R. 1993. A seductive and troubling work. *Archaeology*, 64–69.

Emre, K. 1963. The pottery of the Assyrian period colony. *Anatolia* 7, 87–99.

Eriksen, T.H. 1993. In which sense do cultural islands exist? *Social Anthropology* 1, 133–147.

Evans, A. 1921–1935. *The palace of Minos at Knossos*. London: Palgrave Macmillan.

Evans, J.D. 1971. Neolithic Knossos: The growth of a settlement. *Proceedings of the Prehistoric Society* 37, 95–117.

Evans, J.D. 1973. Islands as laboratories for the study of culture process. In: C. Renfrew (ed.) *The exploration of culture change: Models in prehistory*. London: Duckworth, pp. 517–520.

Evans, J.D. 1977. Island archaeology in the Mediterranean: Problems and opportunities. *World* Archaeology 9, 12–26.

Evans, J.D. 1994. The early millennia: Continuity and change in a farming settlement. In: D. Evely, H. Hughes-Brock and N. Momigliano (eds.) *Knossos. A labyrinth of history: Papers presented in honour of Sinclair Hood*. London: British School at Athens, pp. 1–20.

Evans, J.D., J.R. Cann, A.C. Renfrew, I.W. Cornwall and A.C. Western. 1964. Excavations in the Neolithic settlement of Knossos, 1957–1960. Part I. *Annual of the British School at Athens* 59, 132–240.

Evans, J.D. and A.C. Renfrew. 1968. *Excavations at Saliagos near Antiparos*. London: British School at Athens.

Fairbanks, R.G. 1989. A 17,000-year glacio-eustatic sea level record: Influence of glacial melting rates on the Younger Dryas event and deep-ocean circulation. *Nature* 342, 637–642.

Fears, J.R. 1978. Atlantis and the Minoan thalassocracy: Fact or fiction In: E.S. Ramage (ed.) *Atlantis*. Bloomington: Indiana University Press, pp. 103–134.

Fiedler, K.G. 1841. *Reise durch alle Theile des Königreiches Griechenland. Vol. 2*. Leipzig: Fleischer.

Figueira, T.J. 1981. *Aegina: Society and politics*. New York: Arno Press.

Finné, M., K. Homgren, H.S. Sundqvist, E. Weiberg and M. Lindblom. 2011. Climate in the eastern Mediterranean, and adjacent regions, during the past 6000 years – A review. *Journal of Archaeological Science* 38, 3153–3173.

Fitton, J.L. 1996. *The discovery of the Greek Bronze Age*. Cambridge, MA: Harvard University Press.

Fitzhugh, W.W. 1997. Biogeographical archaeology in the eastern North American arctic. *Human Ecology* 25, 385–418.

Flemming, N.C. 1978. Holocene eustatic changes and coastal tectonics in the northeast Mediterranean: Implications for models of crustal composition. *Philosophical Transactions of the Royal Society of London. Series A, Mathematical and Physical Sciences* 289, 405–458.

Forsyth, P.Y. 1997. *Thera in the Bronze Age*. New York: Peter Lang.
Fotiadis, M. 2006. Collecting prehistoric antiquities in the 19th century Aegean. In: P. Darcque, M. Fotiadis and O. Polychronopoulou (eds.) *Mythos: La Préhistoire Égéenne du XIXe au XXIe siècle après J.-D*. (Bulletin de Correspondance Hellénique Suppl. 46). Athens: École Française d'Athènes, pp. 9–15.
Fotou, V. 1983. Les sites de l'époque Néolithique et de l'Âge du Bronze à Naxos. *Les Cyclades, matériaux pour une étude de géographie historique. Table ronde réunie à l'université de Dijon les 11, 12 et 13 mars 1982*. Paris: Editions du Centre National de la Recherche Scientifique, pp. 15–57.
Fouqué. 1879. *Santorin et ses éruptions*. Paris. Libraire de l'Académie de Médecine.
Francaviglia, V. 1990. Sea-borne pumice deposits of archaeological interest on Aegean and Eastern Mediterranean beaches. In: D.A. Hardy et al. (eds.) *Thera and the Aegean World III*. *Proceedings of the Third International Congress, Santorini, Greece, 6–9 September, 1989*. London: Thera Foundation, pp. 127–134.
French, E. 1985. The figures and figurines. In: C. Renfrew et al. (ed.) *The archaeology of cult: The Sanctuary at Phylakopi*. London: The British School at Athens, pp. 209–280.
French, E. 2007. The figurines. In: C. Renfrew et al. (eds.) *Excavations at Phylakopi in Melos, 1974–77*. Suppl. Vol No. 42. London: British School at Athens, pp. 437–443.
Friedrich, W.L. 2000. *Fire in the sea*. Cambridge: Cambridge University Press.
Friedrich, W.L. and H. Heinemeier. 2009. The Minoan eruption of Santorini radiocarbon dated to 1613 ±13 BC geological and stratigraphic considerations. In: D.A. Warburton (ed.) Time's up. Dating the Minoan eruption of Santorini. Athens: Danish Institute at Athens, pp. 56–63.
Friedrich, W.L., B. Kromer, M. Friedrich, J. Heinemeier, T. Pfeiffer and S. Talamo. 2006. Santorini eruption radiocarbon dated to 1627–1600 BC. *Science* 312 (5773), 548–548.
Friedrich, W.L., P. Wagner and H. Tauber. 1990. Radiocarbon dated plant remains from the Akrotiri excavations on Santorini, Greece. In: D.A. Hardy et al. (eds.) *Thera and the Aegean World III*. *Proceedings of the Third International Congress, Santorini, Greece, 6–9 September, 1989*. London: Thera Foundation, pp. 188–196.
Furumark, A. 1941. *The chronology of Mycenaean pottery*. Stockholm: Kungl. Vitterhets, Historie och Antikvitets Akademien.
Furumark, A. 1950. The settlement at Ialysos and Aegean history, ca. 1550–1400 B.C. *Op Arch* VI, 150–271.
Galanakis, Y. 2013. Early prehistoric research on Amorgos and the beginnings of Cycladic archaeology. *American Journal of Archaeology* 117, 181–205.
Galanakis, Y. and S. Skaltsa. 2012. Tomb robbers, art dealers, and a dikast's pinakion from an Athenian grave. *Hesperia* 81, 619–653.
Galanidou, N. 2011. Mesolithic cave use in Greece and the mosaic of human communities. *Journal of Mediterranean Archaeology* 24, 219–242.
Galanidou, N. and C. Perles. 2003. An Introduction to the Greek Mesolithic. In: Galanidou and C. Perles (eds.) *The Greek Mesolithic: Problems and perspectives*. BSA Studies 10. London: BSA, pp. 27–32.
Gale, N.H. 1998. The role of Kea in metal production and trade in the Late Bronze Age. In: L.G. Mendoni and A.M. Ainian (eds.) *Kea-Kythnos: History and archaeology*. *Proceedings of an International Symposium Kea-Kythnos, 22–25 June 1994*. Athens: Research Centre for Greek and Roman Antiquity/National Hellenic Research Foundation, pp. 737–758.
Gale, N.H. and Z.A. Stos-Gale. 1989. Some aspects of early Cycladic copper metallurgy. In: C. Domergue (ed.) *Minera y metalurgia en las antiguas civilisaciones Mediterraneans y Europas*. Madrid: Ministerio de Cultura, pp. 21–38.
Gale, N.H. and Z.A. Stos-Gale. 2008. Changing patterns in prehistoric Cycladic metallurgy. In: N. Brodie, J. Doole, G. Gavalas and C. Renfrew (eds.) *Horizon: A colloquium on the prehistory of the Cyclades*. Cambridge: McDonald Institute for Archaeological Research, pp. 387–408.
Gallant, T.W. 1985. *A fisherman's tale*. Ghent: Belgian Archaeological Mission in Greece/Seminar for Greek Archaeology of the State University of Ghent.
Gallant, T.W. 1991. *Risk and survival in ancient Greece*. Oxford: Oxford University Press.

Gamble, C. 1978. The Bronze Age animal economy from Akrotiri: A preliminary analysis. In: C.G. Doumas (ed.) *Thera and the Aegean World. Papers Presented at the Second International Scientific Congress, Santorini, Greece, August 1978*. London: Thera Foundation, pp. 745–753.

Gamble, C. 1979. Surplus and self-sufficiency in the Cycladic subsistence economy. In: J.L. Davis and J.F. Cherry (eds.) *Papers in Cycladic prehistory*. Los Angeles: University of California, pp. 122–134.

Gamble, C. 1982. Animal husbandry, population and urbanisation. In: A.C. Renfrew and J.M. Wagstaff (eds.) *An island polity: The archaeology of exploitation in Melos*. Cambridge: Cambridge University Press, pp. 161–171.

Garland, A. 1996. *The beach*. New York: Riverhead Books.

Gazi, A. 1993. Archaeological museums in Greece (1829–1909). The display of Archaeology. Unpublished PhD thesis. University of Leicester.

Gazi, A. 1994. Archaeological museums and displays in Greece 1829–1909: A first approach. *Museological Review* 1, 70–88.

Gazi, A. 2008. 'Artfully classified' and 'appropriately placed': Notes on the display of antiquities in early twentieth-century Greece. In: D. Damaskos and D. Plantzos (eds.) *A singular antiquity*. Athens: Benaki Museum, pp. 67–82.

Georgakopoulou, M. 2013. Metal artefacts and metallurgy. In: A.C. Renfrew, O. Philaniotou, G. Gavalas, N. Brodie and M. Boyd (eds.) *The sanctuary on Keros and the origins of Aegean ritual practice: The excavations of 2006–2008. Volume I: The settlement at Dhaskalio*. Cambridge: McDonald Institute for Archaeological Research, pp. 667–692.

Georgakopoulou, M. 2016. Mobility and Early Bronze Age southern Aegean metal production. In: E. Kiriatzi and C. Knappett (eds.) *Human mobility and technological transfer in the prehistoric Mediterranean*. Cambridge: Cambridge University Press, pp. 46–67.

Georgakopoulou, M., Y. Bassiakos and O. Philandiotou. 2011. Seriphos surfaces: A study of copper slag heaps and copper sources in the context of Early Bronze Age Aegean metal production. *Archaeometry* 53, 123–145.

Georgiadis, M. 2003. The south-eastern Aegean in the Mycenaean period. Islands, landscape, death and ancestors. Unpublished PhD thesis, University of Liverpool.

Georgiadis, M. 2008. The obsidian in the Aegean beyond Melos: An outlook from Yali. *Oxford Journal of Archaeology* 27, 101–117.

Georgiou, H.S. 1986. *Keos VI: Ayia Irini. Specialized domestic and industrial pottery*. Mainz. von Zabern.

Georgiou, H.S. 1991. Bronze Age ships and rigging. In: R. Laffineur and L. Basch (eds.) *Thalassa. L'Egéen Prehistorique et la Mer* (Aegaeum 7). Liège: Université de Liège, pp. 61–71.

Georgiou, H.S. 1993. A sea approach to trade in the Aegean Bronze Age. In: C. Zerner and J. Winder (eds.) *Wace and Blegen: Pottery as evidence for trade in the Aegean Bronze Age 1939–1989*. Amsterdam: J.C. Gieben, pp. 353–364.

Georgiou, H.S. and N. Faraklas. 1985. Ancient habitation pattern of Keos: Locations and nature of sites on the northwest part of the island. *Ariadne* 3, 207–266.

Getz-Gentle, P. 1996. *Stone vessels of the Cyclades in the Early Bronze Age*. Pennsylvania: Pennsylvania State University Press.

Getz-Gentle, P. 2001. *Personal styles in early Cycladic sculpture*. Madison: University of Wisconsin Press.

Getz-Preziosi, P. 1981. Risk and repair in Early Cycladic sculpture. *Metropolitan Museum Journal* 16, 19–23.

Getz-Preziosi, P. 1983. The 'Keros Hoard': Introduction to an Early Cycladic enigma. In: D. Metzler, B. Otto and C. Müller-Wirth (eds.) *ANTIDORON: Festschrift für Jürgen Thimme zum 65. Geburtstag am 26. September 1982*. Karlsruhe: Verlag Müller, pp. 37–44.

Getz-Preziosi, P. 1987. *Sculptors of the Cyclades: Individual and tradition in the third millennium BC*. Ann Arbor: University of Michigan Press.

Getz-Preziosi, P. 1994. *Early Cycladic sculpture: An introduction* (revised edition). Malibu, CA: J. Paul Getty Museum.

Gill, D.W.J. and C. Chippendale. 1993. Material and intellectual consequences of esteem for Cycladic figures. *American Journal of Archaeology* 97, 601–659.

Gillis, J. 2004. *Islands of the mind*. New York: Palgrave Macmillan.

Girella, L. and P. Pavuk. 2016. The nature of Minoan and Mycenaean involvement in the northeastern Aegean. In: E. Gorogianni, P. Pavuk and L. Girella (eds.) *Beyond thalassocracies*. Oxford: Oxbow Book, pp. 15–42.

Golding, W. 1954. *Lord of the flies*. London: Faber.

Goodison, L. 1989. *Death, women and the sun. Symbolism of regeneration in Early Aegean religion*. London: Institute of Classical Studies.

Gorogianni, E., N. Abell and J. Hilditch. 2016. Reconsidering technological transmission: The introduction of the potter's wheel at Ayia Irini, Kea, Greece. *American Journal of Archaeology* 120, 1–41.

Gorogianni, E., P. Pavuk and L. Girella (eds.). 2016. *Beyond thalassocracies*. Oxford: Oxbow Book.

Graziadio, G. 1998. Trade circuits and trade-routes in the Shaft Grave period. *Studi Micenei ed Egeo-Anatolici* 40, 29–76.

Grmek, M.D. 1989. *Disease in the ancient Greek world*. Baltimore: Johns Hopkins University Press.

Gropengiesser, H. 1986. Siphnos, Kap Agios Sostis: Keramische prähistorische Zeugnisse aus dem Gruben-und Hüttenrevier. *Athenische Mitteilungen* 101, 1–39.

Gropengiesser, H. 1987. Siphnos, Kap Agios Sostis: Keramische prähistorische Zeugnisse aus dem Gruben-und Hüttenrevier II. *Athenische Mitteilungen* 102, 1–54.

Grove, A.T. and O. Rackham. 2001. *The nature of Mediterranean Europe: An ecological history*. New Haven and London: Yale University Press.

Grove, R.H. 1995. *Green imperialism: Colonial expansion, tropical island Edens, and the origins of environmentalism, 1600–1860*. Cambridge: Cambridge University Press.

Guest-Papamanoli, A. 1983. Pêche et pêcheurs Minoens: Proposition pour une recherche. In: L. Nixon and O.H. Kryszkowska (eds.) *Minoan society. Proceedings of the Cambridge Colloquium 1981*. Bristol: Bristol Classical Press, pp. 101–110.

Hadjianastasiou, O. 1993. Naxian pottery and external relations in Late Cycladic I-II. In: C. Zerner and J. Winder (eds.) *Wace and Blegen: Pottery as Evidence for Trade in the Aegean Bronze Age 1939-1989. Proceedings of the International Conference Held at the American School of Classical Studies at Athens, 2–3 December, 1989*. Amsterdam: Gieben, pp. 257–262.

Hägg, R. and N. Marinatos. 1984. *The Minoan Thalassocracy: Myth and reality. Proceedings of the Third International Symposium at the Swedish Institute in Athens, 31 May–5 June, 1982*. Stockholm: Svenska Institutet i Athen.

Hall, H.R. 1905. The excavations at Phylakopi. *Classical Review* 19, 79–84.

Halstead, P. 1977. The Bronze Age demography of Crete and Greece – A note. *Annual of the British School at Athens* 72, 107–111.

Halstead, P. 1981. From determinism to uncertainty: Social storage and the rise of the Minoan palace. In: A. Sheridan and G. Bailey (eds.) *Economic archaeology* (BAR International Series 96). Oxford: British Archaeological Reports, pp. 187–213.

Halstead, P. 1989. The economy has a normal surplus: Economic stability and social change among early farming communities of Thessaly, Greece. In: P. Halstead and J. O'Shea (eds.) *Bad years economics*. Cambridge: Cambridge University Press, pp. 68–80.

Halstead, P. 1992. Agriculture in the Bronze Age Aegean. Towards a model of palatial economy. In: B. Wells (ed.) *Agriculture in ancient Greece. Proceedings of the 7th International Symposium at the Swedish Institute at Athens, 16–17 May, 1990*. Stockholm: Svenska Institutet i Athen, pp. 105–117.

Halstead, P. 1996. Pastoralism or household herding? *World Archaeology* 28, 20–42.

Halstead, P. 2000. Land use in postglacial Greece: Cultural causes and environmental effects. In: P. Halstead and C. Frederick (eds.) *Landscape and land use in postglacial Greece*. Sheffield: Sheffield Academic Press, pp. 110–128.

Halstead, P. 2005. Resettling the Neolithic: Faunal evidence for seasons of consumption and residence at Neolithic sites in Greece. In: D. Bailey, A. Whittle and V. Cummings (eds.) *(Un)Settling the Neolithic*. Oxford: Oxbow Books, pp. 38–50.

Halstead, P. 2006. Carcasses and commensality: Investigating the social context of meat consumption in Neolithic and Early Bronze Age Greece. In: C. Mee and U. Renard (eds.) *Cooking up the past*. Oxford: Oxbow Books, pp. 25–48.

Halstead, P. 2008. Between a rock and a hard place: Coping with marginal colonization in the Later Neolithic and Early Bronze Age of Crete and the Aegean. In: V. Isaakidou and P. Tomkins (eds.) *Escaping the labyrinth: The Cretan Neolithic in context*. Oxford: Oxbow Books, pp. 229–257.

Halstead, P. and V. Isaakidou. 2011. Revolutionary secondary products: the development and significance of milking, animal-traction and wool-gathering in later prehistoric Europe and the Near East. In: T. Wilkinson, S. Sherratt and J. Bennet (eds.) Interweaving worlds: Systemic interactions in Eurasia, 7th to 1st Millennia BC. Oxford: Oxbow Books, pp. 61–76.

Halstead, P. and G. Jones. 1989. Agrarian ecology in the Greek islands: Time stress, scale and risk. *Journal of Hellenic Studies* 109, 41–55.

Hamilakis, Y. 1996. Wine, oil and the dialectics of power in Bronze Age Crete: A review of the evidence. *Oxford Journal of Archaeology* 15, 1–32.

Hamilakis, Y. 1999. Food technologies/technologies of the body: The social context of wine and oil production and consumption in Bronze Age Crete. *World Archaeology* 31, 38–54.

Hamilakis, Y. 2002. What future for the 'Minoan' past? Re-thinking Minoan archaeology. In: Y. Hamilakis (ed.) *Labyrinth revised: Rethinking 'Minoan' archaeology*. Oxford: Oxbow Books, pp. 2–28.

Hammer, C.U. and H.B. Clausen. 1990. The precision of ice-core dating. In: D.A. Hardy, C.G. Doumas, J.A. Sakellarakis and P.M. Warren (eds.) *Thera and the Aegean World III. Vol. 3. Proceedings of the Third International Congress, Santorini, Greece, 6–9 September, 1989*. London: Thera Foundation, pp. 174–178.

Hammer, C.U., H.B. Clausen, W.L. Friedrich and H. Tauber. 1987. The Minoan eruption of Santorini in Greece dated to 1645 BC? *Nature* 328, 517–518.

Hammer, C.U., G. Kurat, P. Hoppe, W. Grum, and H.B. Clausen. 2003. Thera eruption date 1645 BC confirmed by new ice core data? In: M. Bietak (ed.) *The Synchronisation of civilisations in the Eastern Mediterranean in the second millennium B.C.* (Proceedings of the SCIEM 2000-EuroConference Haindorf, May 2001). Vienna: Verlag der Österreichischen Akademie der Wissenschaften, pp. 87–93.

Hansen, J.M. 1988. Agriculture in the prehistoric Aegean: Data versus speculation. *American Journal of Archaeology* 92, 39–52.

Hansen, J.M. 1991. *The Palaeoethnobotany of Franchthi cave. Excavations at Franchthi Cave, Greece* (Fasc. 7).

Hantemirov, R.M. and S.G. Shiyatov. 2002. A continuous multimillennial ring-width chronology in Yamal, northwestern Siberia, *The Holocene* 12, 717–726.

Hardy, D.A. et al. (eds.). 1990. *Thera and the Aegean World III. Proceedings of the Third International Congress, Santorini, Greece, 6–9 September, 1989*. London: Thera Foundation.

Harvati, K., E. Panagopoulou and C. Runnels. 2009. The paleoanthropology of Greece. *Evolutionary Anthropology* 18, 131–143.

Heidenreich, R. 1935/36. Vorgeschichtliches in der Stadt Samos. Die Funde. *Mitteilungen des Deutschen Archäologischen Instituts* 60/61, 125–183.

Heikell, R. 1988. *Mediterranean sailing*. London: Nautical Books.

Heikell, R. 2001. *Greek waters pilot*. St Ives: Imray, Laurie, Norie & Wilson.

Heinemeier, J., W.L. Friedrich, B. Kromer and C. Bronk Ramsey. 2009. The Minoan eruption of Santorini radiocarbon dated by an olive tree buried by the eruption. In: D.A. Warburton (ed.) *Time's up: Dating the Minoan eruption of Santorini*. Athens: Danish Institute at Athens, pp. 285–293.

Hekman, J.J. 2003. The Early Bronze Age cemetery at Chalandriani on Syros (Cyclades, Greece). Unpublished PhD thesis. Univerity of Groningen.

Hendrix, E. 1998. Painted ladies of the Early Bronze Age. *Metropolitan Museum of Art Bulletin* 55, 4–15.

Herodotus. 1921. *Histories (with an English translation by A.D. Godley)*. London/New York: Heinemann/Putnam's Sons.

Herz, N. 1992. Provenance determination of Neolithic to Classical Mediterranean marbles by stable isotopes. *Archaeometry* 34, 185–194.

Herz, N. and C. Doumas. 1990. Marble sources in the Aegean Early Bronze Age. In: E. Pernicka and G. Wagner (eds.) *Archaeometry '90: 27th International Symposium.* Basel: Birkenhäuser Verlag, pp. 425–434.

Higgins, M.D. and R. Higgins. 1996. *A geological companion to Greece and the Aegean*. Ithaca, NY: Cornell University Press.

Hilditch, J.R. 2008. Reconstruction of technological choice, social practice and networks of exchange from a ceramic perspective in the Middle Bronze Age. Unpublished PhD thesis. University of Exeter.

Hitchcock, L.A. 1998. Blending the local with the foreign: Minoan features at Ayia Irini, House A. In: L.G. Mendoni and A.M. Ainian (eds.) *Kea-Kythnos: History and Archaeology*. *Proceedings of an International Symposium Kea-Kythnos, 22–25 June 1994*. Athens: Research Centre for Greek and Roman Antiquity/National Hellenic Research Foundation, pp. 169–174.

Hitchcock, L.A. 2000. *Minoan architecture: A contextual analysis*. Jonsered: Aström.

Hitchcock, L.A. 2010. Minoan architecture. In: E. Cline (ed.) *Oxford handbook of the Bronze Age Aegean*. Oxford: Oxford University Press, pp. 189–199.

Höckmann, O. 1977. Cycladic religion. In: J. Thimme, P. Getz- Preziosi and B. Otto (eds.) *Art and culture of the Cyclades in the third millennium BC*. Chicago: University of Chicago Press, pp. 37–52.

Hodder, I. 1978a. Simple correlations between material culture and society: a review. In: I. Hodder (ed.) *The spatial organisation of culture*. London: Duckworth, pp. 3–24.

Hodder, I. 1978b. Some effects of distance on patterns of human interaction. In: I. Hodder (ed.) *The spatial organisation of culture*. London: Duckworth, pp. 155–178.

Hodder, I. 1982. *Symbols in action*. Cambridge: Cambridge University Press.

Hoffman, G.L. 2002. Painted ladies: Early Cycladic II mourning figures? *American Journal of Archaeology* 106, 525–550.

Höflmayer, F. 2011. Egyptian pots, Aegean chronology and radiocarbon dating: Recent research on Egypt and the Aegean early Late Bronze Age. In: M. Horn, J. Kramer, D. Soliman, N. Staring, C. van den Hoven and L. Weiss (eds.) *Current Research on Egyptology 2010. Proceedings of the 11th Annual Symposium, Leiden University, Netherlands, January 2010*. Oxford: Oxbow Books, pp. 62–70.

Höflmayer, F. 2012. The date of the Minoan Santorini eruption: quantifying the 'offset'. *Radiocarbon* 54, 435–448.

Hogarth, D.G. 1910. *Accidents of an antiquary's life*. London: Palgrave Macmillan.

Hood, S. (1981/1882). *Excavation in Chios, 1938-1955: Prehistoric Emporio and Ayia Gala*. London: Thames & Hudson.

Hood, M.S.F. 1984. Mycenaeans in Chios. In: J. Boardman and C.E. Vaphopoulou-Richardson (eds.) *Chios: A conference at the Homereion in Chios, 1984*. Oxford: Clarendon Press, pp. 169–180.

Hope Simpson, R. and D.K. Hagel. 2006. *Mycenaean fortifications, highways, dams and canals* (SIMA 133). Sävedalen: Aströms.

Hope Simpson, R. and J.F. Lazenby. 1962. Notes from the Dodecanese. *Annual of the British School at Athens* 57, 154–175.

Hope Simpson, R. and J.F. Lazenby. 1970. Notes from the Dodecanese. *Annual of the British School at Athens* 65, 47–76.

Hope Simpson, R. and J.F. Lazenby. 1973. Notes from the Dodecanese. *Annual of the British School at Athens* 68, 127–179.

Horden, P. and N. Purcell. 2000. *The corrupting sea: A study of Mediterranean history*. Oxford: Blackwell.

Housley, R.A., S.W. Manning, G. Cadogan, R.E. Jones and R.E.M. Hedges. 1999. Radiocarbon, calibration and the chronology of the Late Minoan IB phase. *Journal of Archaeological Science* 26, 159–171.

Howitt-Marshall and C. Runnels. 2016. Middle Pleistocene sea-crossings in the eastern Mediterranean? *Journal of Anthropological Archaeology* 42, 140–153.

Hubberten, H.-W., M. Bruns, M. Calamiotou, C. Apostolakis, S. Filippakis and A. Grimanis. 1990. Radiocarbon dates from the Akrotiri excavations. In: D.A. Hardy et al. (eds.) *Thera and the Aegean World III. Proceedings of the Third International Congress, Santorini, Greece, 6–9 September, 1989*. London: Thera Foundation, pp. 179–187.

Isaakidou, V. 2006. Ploughing with cows: Knossos and the secondary products revolution. In: D. Serjeantson and D. Field (eds.) *Animals in the Neolithic of Britain and Europe*. Oxford: Oxbow Books, pp. 95–112.

Jameson, M., C. Runnels, and T. van Andel. 1994. *A Greek countryside: The Southern Argolid from prehistory to the present day*. Stanford: Stanford University Press.

Jarman, M.R. 1996. Human influence in the development of the Cretan mammalian fauna. In: D.S. Reese (ed.) *Pleistocene and Holocene fauna of Crete and its first settlers*. Madison, Wisconsin: Prehistoric Press, pp. 211–229.

Johnson, M. 1996. Water, animals and agricultural technology: A study of settlement patterns and economic change in Neolithic southern Greece. *Oxford Journal of Archaeology* 15, 267–295.

Johnston, E.N., Sparks, R.S.J., Phillips, J.C. and S. Carey. 2014. Revised estimates for the volume of the Late Bronze Age Minoan eruption, Santorini, Greece. *Journal of the Geological Society* 171, 583–590.

Jones, G. 1987. Agricultural practices in Greek prehistory. *Annual of the British School at Athens* 82, 115–123.

Jones, R.E. 1986. *Greek and Cypriot pottery: A review of scientific studies*. (Fitch Laboratory Occasional Paper, 1.) Athens: British School at Athens.

Kaczanowska, M. and J.K. Kozlowski. 2008. Chipped stone artifacts. In: A. Sampson (ed.) *The Cave of Cyclops: Mesolithic and Neolithic networks in the northern Aegean, Greece. Vol. 1. Intra-site analysis, local industries, and regional site distribution*. Philadelphia: INSTAP Academic Press, pp. 169–178.

Kapsimalis, V., I. Pavlopoulos, I. Panagiotopoulos, P. Drakopoulou, D. Vandarakis, D. Sakelariou and C. Anagnostou. 2009. Geoarchaeological challenges in the Cyclades continental shelf (Aegean sea). *Zeitschrift für Geomorphologie* N.F. 53, (Supplement 1), 169–190.

Karali, L. 1990. Sea shells, land snails and other marine remains from Akrotiri. In: D.A. Hardy et al. (eds.) *Thera and the Aegean World III. Proceedings of the Third International Congress, Santorini, Greece, 6–9 September, 1989*. London: Thera Foundation, pp. 410–415.

Karali, L. 1996. Marine invertebrates and Minoan art. In: D.S. Reese (ed.) *Pleistocene and Holocene fauna of Crete and its first settlers*. Madison, Wisconsin: Prehistoric Press, pp. 413–422.

Karali, L. 1999. *Shells in Aegean prehistory* (BAR International Series 761). Oxford: Archaeopress.

Karantzali, E. 2005a. The Mycenaeans at Ialysos: trading station or colony? In: R. Laffineur and E. Greco (eds.) *Emporia: Aegeans in the Central Mediterranean* (Aegaeum 25). Liège: Université de Liège, pp. 141–151.

Kardara, C. 1977. *Aplomata Naxou: Kineta evremata Taphon A kai B*. Athens: Athenais Archaiologiki Etaireias.

Karimali, E. 2008. Lithic and metal tools in the Bronze Age Aegean: A parallel relationship. In: I. Tzachili (ed.) *Aegean metallurgy in the Bronze Age*. Athens: Ta Pragmata Publications, pp. 315–326.

Karnava, A. 2008. Written and stamped records in the Late Bronze Age Cyclades: The sea journeys of an administration. In: N. Brodie, J. Doole, G. Gavalas and C. Renfrew (eds.) *Horizon: A colloquium on the prehistory of the Cyclades*. Cambridge: Cambridge University Press, pp. 377–386.

Karnava, A. and I. Nikolakopoulou. 2005. A pithos fragment with a Linear A inscription from Akrotiri, Thera. *Studi Micenei ed Egeo-Anatolici* 47, 213–225.

Katsa-Tomara, L. 1990. The pottery-producing system at Akrotiri: An index of exchange and social activity. In: D.A. Hardy et al. (eds.) *Thera and the Aegean World III. Proceedings of the Third International Congress, Santorini, Greece, 6–9 September, 1989*. London: Thera Foundation, pp. 31–40.

Kazantzakis, N. 1952. *Zorba the Greek*. New York: Scribner & Schuster Inc.

Keegan, W.F. and J.M. Diamond. 1987. Colonization of islands by humans: A biogeographical perspective. *Advances in Archaeological Method and Theory* 10, 49–92.

Keenan, D.J. 2003. Volcanic ash retrieved from the GRIP ice core is not from Thera. *G3: Geochemistry, Geophysics, Geosystems* 4(11), 1097.

Kilikoglou, V. et al. 1990. A study of Middle and Late Cycladic pottery from Akrotiri. In: D.A. Hardy et al. (eds.) *Thera and the Aegean World III. Proceedings of the Third International Congress, Santorini, Greece, 6–9 September, 1989*. London: Thera Foundation, pp. 441–448.

King, R. 1993. The geographical fascination of islands In: D.G. Lockhart, D. Drakakis-Smith and J. Schembri (eds.) *The development process in small island states*. London: Routledge, pp. 13–37.

Kirch, P.V. 1980. The archaeological study of adaptation: Theoretical and methodological issues. In: M.B. Schiffer (ed.) *Advances in archaeological method and theory*. New York: Academic Press, pp. 101–156.

Kludas, A. 2001. *Vergnügungsreisen zur See: eine Geschichte der deutschen Kreuzfahrt*. Vol. 1. Hamburg: Convent.

Knappett, C., T. Evans and R. Rivers. 2011. The Theran eruption and Minoan palatial collapse: New interpretations gained from modelling the maritime network. *Antiquity* 85, 1008–1023.

Knappett, C. and I. Nikolakopoulou. 2005. Exchange and affiliation networks in the MBA Southern Aegean: Crete, Akrotiri and Miletus. In: R. Laffineur and E. Greco (eds.) *Emporia: Aegeans in the Central Mediterranean* (Aegaeum 25). Liège: Université de Liège, pp. 175–183.

Knappett, C. and I. Nikolakopoulou. 2008. Colonialism without colonies? A Bronze Age case study from Akrotiri, Thera. *Hesperia* 77, 1–42.

Knappett, C., et al. 2011. Mineralogical analysis and provenancing of ancient ceramics using automated SEM-EDS analysis (QEMSCAN): A pilot study on LB I pottery from Akrotiri, Thera. *Journal of Archaeological Science* 38, 219–232.

Koehl, R.B. 1984. Observations on a deposit of LC IIIC pottery from the Koukounaries acropolis on Paros. In: J.A. MacGillivray and R.L.N. Barber (eds.) *The prehistoric Cyclades*. Edinburgh: Department of Archaeology, pp. 207–224.

Kouka, O. 2002. Siedlungsorganisation in der Nord und Ost Aegais während der Frühbronzezeit. Rahden-West: VML.

Kouka, O. 2008. Zur Struktur der frühbronzezeitlichen insularen Gesellschaften der Nord- und Ostägäis: ein neues Bild der sogenannten 'Trojanischen Kultur'. In: H. Erkanal et al. (eds.) *The Aegean in the Neolithic, Chalcolithic and the Early Bronze Age*. Ankara: Ankara University Press, pp. 285–300.

Kouka, O. 2013. 'Minding the gap'. Against the gaps. The Early Bronze Age and the transition to the Middle Bronze Age in the Northern and Eastern Aegean/Western Anatolia. *American Journal of Archaeology* 117, 569–580.

Kourou, N. 2001. Tenox-Xobourgo: a new defensive site in the Cyclades. In: V. Karageorghis and C.E. Morris (eds.) *Defensive settlements of the Aegean and the eastern Mediterranean after c. 1200 BC*. Nicosia: Trinity College Dublin and Anastasios G. Leventis Foundation, pp. 171–190.

Kuniholm, P.I., B. Kromer, S.W. Manning, M. Newton, C.E. Latini and M.J. Bruce. 1996. Anatolian tree rings and the absolute chronology of the eastern Mediterranean, 2220–718 BC. *Nature* 381, 780–783.

Kyparissi-Apostolika, N. 2003. The Mesolithic in Theopetra Cave: New data on a debated period of Greek prehistory. In: N. Galanidou and C. Perlès (eds.) *The Greek Mesolithic. Problems and perspectives*. London: British School at Athens, pp. 189–198.

LaMarche, V.C. and K.K. Hirschboeck. 1984. Frost rings in trees as records of major volcanic eruptions. *Nature* 307, 121–126.

Lambeck, K. 1996. Sea-level change and shore-line evolution in Aegean Greece since Upper Palaeolithic time. *Antiquity* 70, 588–611.

Lambrinoudakis, V. and O. Philaniotou-Hadjianastasiou. 2001. The town of Naxos at the end of the Late Bronze Age: The Mycenaean fortification wall. In: V. Karageorghis and C.E. Morris (eds.) *Defensive settlements of the Aegean and the Eastern Mediterranean after c. 1200 BC*. Nicosia: Trinity College Dublin and Anastasios G. Leventis Foundation, pp. 157–170.

Laskaris, N., A. Sampson, F. Mavridisand I. Liritzis. 2011. Late Pleistocene/Early Holocene seafaring in the Aegean: New obsidian hydration dates with the SIMS-SS method. *Journal of Archaeological Science* 38, 2475–2479.

Leiner, D. 2011. Die frühbronzezeitliche Architektur in der Ägäis. Studien zu Siedlungsformen, Urbanistik und Bauwesen. In: F. Blakolmer and J. Wilhartner (eds.) *Österreichische Forschunge zur Ägäischen Bronzezeit 2009*. Wien: Phoibos Verlag, pp. 205–218.

Lemos, I.S. 2002. *The Protogeometric Aegean: The archaeology of the late eleventh and tenth centuries BC*. Oxford: Oxford University Press.

Leppard, T.P. 2014. Modeling the impacts of Mediterranean island colonization by archaic hominins: The likelihood of an insular Lower Palaeolithic. *Journal of Mediterranean Archaeology* 27, 231–253.

Limbrey, S. 1990. Soil studies at Akrotiri. In: D.A. Hardy, C.G. Doumas, J.A. Sakellarakis and P.M. Warren (eds.) *Thera and the Aegean World III. Vol. 1*. *Proceedings of the Third International Congress, Santorini, Greece, 6–9 September, 1989*. London: Thera Foundation, pp. 377–382.

Lin, Y.-S. and J.-Y. Huang. 2006. Internet blogs as a tourism marketing medium: A case study, *Journal of Business Research* 59, 1201–1205.

Lindenlauf, A. 2003. The sea as a place of no return in ancient Greece. *World Archaeology* 35, 416–433.

Lolos, Y.G. 1990. On the Late Helladic I of Akrotiri, Thera. In: D.A. Hardy et al. (eds.) *Thera and the Aegean World III*. *Proceedings of the Third International Congress, Santorini, Greece, 6–9 September, 1989*. London: Thera Foundation, pp. 51–56.

Losos, J.B. and R.E. Ricklefs. 2009. *The theory of island biogeography revisited*. Oxford. Princeton University Press.

Loxley, D. 1990. *Problematic shores: The literature of islands*. London: Palgrave Macmillan.

MacArthur, R.H. and E.O. Wilson. 1967. *Theory of island biogeography*. Princeton: Princeton University Press.

Macdonald, C.F., E. Hallager and W.-D. Niemeier (eds.). 2009. *The Minoans in the central, eastern and northern Aegean – New evidence* (Monographs of the Danish Institute at Athens 8). Athens: Danish Institute at Athens.

MacGillivray, J.A. and R.L.N. Barber (eds.) 1984 *The prehistoric Cyclades*. Edinburgh: Department of Classical Archaeology, University of Edinburgh.

Maiuri, A. 1928. Esplorazione di Grotte con Avanzi Preistorici nell' Isola di Calimno In: A. Maiuri and G. Jacopich (eds.) *Clara Rhodos I: Studi e Materiali Pubblicati a Cura dell' Istituto Storico Archeologico di Rodi*. Rhodos: Istituto Storico-Archeologico, pp. 104–117.

Maiuri, A. 1928–1941. *Clara Rhodos I–X*. Bergamo: Istituto Storico-Archeologico – Rodi.

Malamut, E. 2004. Travellers in the Aegean islands from the twelfth to the sixteenth century. In: J. Chrysostomides, C. Dendrinos and J. Harris (eds.) *The Greek islands and the sea*. Camberley: Porphyrogenitus, pp. 181–198.

Manatt, J.I. 1914. *Aegean days*. Boston: Houghton Mifflin Co.

Maniatis, Y. 2012. Radiocarbon dating of the Late Cycladic building and destruction phases at Akrotiri, Thera: New evidence. *The European Physical Journal Plus* 127, 1–16.

Manning, S. 1995. *The absolute chronology of the Aegean Early Bronze Age*. Sheffield: Sheffield Academic Press.

Manning, S. 1999. *A test of time*. Oxford: Oxbow Books.

Manning, S. 2010. Chronology and terminology. In: E. Cline (ed.) *Oxford handbook of the Bronze Age Aegean*. Oxford: Oxford University Press, pp. 11–28.

Manning, S. 2014. *A test of time and a test of time revisited*. Oxford: Oxbow Books.

Manning, S.W. 1990. The Thera eruption: The third congress and the problem of the date. *Archaeometry* 32, 91–100.

Manning, S.W. 2008. Some initial wobbly steps towards a Late Neolithic to Early Bronze III radiocarbon chronology for the Cyclades. In: N. Brodie, J. Doole, G. Gavalas and C. Renfrew (eds.) *Horizon: A colloquium on the prehistory of the Cyclades*. Cambridge: Cambridge University Press, pp. 55–59.

Manning, S.W., B. Kromer, P.I. Kuniholm, and M.W. Newton. 2001. Anatolian tree rings and a new chronology for the East Mediterranean Bronze-Iron Age. *Science,* New Series 294, 2532–2535.

Manning, S.W., C.B. Ramsey, W. Kutschera, T. Higham, B. Kromer, P. Steier and E.M. Wild. 2006. Chronology for the Aegean Late Bronze Age 1700–1400 B.C. *Science* 312, 565–569.

Manning, S.W., et al. 2014. Dating the Thera (Santorini) eruption: archaeological and scientific evidence supporting a high chronology. *Antiquity* 88, 1164–1179.

Mantzourani, E.K. and A.J. Theodorou. 1991. An attempt to delineate the sea-routes between Crete and Cyprus during the Bronze Age. In: V. Karageorghis (ed.) *The Civilizations of the Aegean and their diffusion in Cyprus and the eastern Mediterranean 2000–600 B.C.* Larnaca: Pierides Foundation, pp. 38–56.

Maran, J. 1998. *Kulturwandel auf dem griechischen Festland und den Kykladen im späten 3. Jahrtausend v. Chr: Studien zu den kulturellen Verhältnissen in Südosteuropa und dem zentralen sowie östlichen Mittelmeerraum in der späten Kupfer- und frühen Bronzezeit*. Bonn: Rudolf Habelt.

Marangou, C. 2001a. Neolithic craft: Evidence about boat types and uses. In: Y. Bassiakos, E. Aloupi and Y. Facorellis (eds.) *Archaeometry issues in Greek Prehistory and Antiquity*. Athens. Hellenic Society of Archaeometry, pp. 737–751.

Marangou, C. 2001b. Neolithic watercraft: Evidence from northern Greek wetlands. In: B.A. Purdy (ed.) *Enduring record: The environmental and cultural heritage of wetlands*. Oxford: Oxbow Books, pp. 192–205.

Marangou, L., C. Renfrew, C. Doumas, and G. Gavalas. 2006. *Markiani, Amorgos: An Early Bronze Age fortified settlement*. Suppl Vol 40. London: British School at Athens.

Margaritis, E. 2013. Distinguishing exploitation, domestication, cultivation and production: The olive in the third millennium Aegean. *Antiquity* 87, 746–757.

Marinatos, S. 1939. The volcanic destruction of Minoan Crete. *Antiquity*, 13, 425–439.

Marinatos, S. 1968–1976. *Excavations at Thera I–VII*. Athens: Athenais Archaiologiki Etaireias.

Marinatos, N. 1984. *Art and religion in Thera*. Athens: D. & I. Mathioulakis.

Marinatos, N. 1990. Minoan-Cycladic syncretism. In: D.A. Hardy et al. (eds.) *Thera and the Aegean World III. Proceedings of the Third International Congress, Santorini, Greece, 6–9 September, 1989*. London: Thera Foundation, pp. 370–376.

Marketou, T. 1988. New evidence on the topography and site history of prehistoric Ialysos. In: S. Dietz (ed.) *Archaeology in the Dodecanese*. Copenhagen: The National Museum of Denmark, pp. 27–33.

Marketou, T. 1998. Excavations at Trianda (Ialysos) on Rhodes: New evidence from the Late Bronze Age I period. *Atti della Accademia Nazionale dei Lincei. Rendiconti* 9, 39–72.

Marketou, T. 2009. Ialysos and its neighbouring areas in the MBA and LB I periods: A chance for peace. In: C. Macdonald, E. Hallager and W.D. Niemeier (eds.) *The Minoans in the central, eastern and northern Aegean – New evidence*. Aarhus: Aarhus University Press, pp. 73–96.

Marketou, T. 2010. Rhodes. In: Cline, E. (ed.) *Oxford handbook of the Bronze Age Aegean*. Oxford: Oxford University Press, pp. 775–793.

Marketou, T. et al. 2006. Pottery wares from the prehistoric settlement at Ialysos (Trianda), Rhodes. *Annual of the British School at Athens* 101, 1–55.

Marthari, M. 1990a. Investigation of the technology of manufacture of the local LBA Theran pottery: Archaeological consideration. In: D.A. Hardy et al. (eds.) *Thera and the Aegean World III. Proceedings of the Third International Congress, Santorini, Greece, 6–9 September, 1989*. London: Thera Foundation, pp. 449–457.

Marthari, M. 1990b. The chronology of the last phases of occupation at Akrotiri in the light of the evidence from the West House Pottery Group. In: D.A. Hardy et al. (eds.) *Thera and the Aegean World III. Proceedings of the Third International Congress, Santorini, Greece, 6–9 September, 1989*. London: Thera Foundation, pp. 57–70.

Marthari, M. 1993. Ceramic evidence for contacts between Thera and the Greek mainland. In: C. Zerner, P. Zerner and J. Winder (eds.) *Wace and Blegen: Pottery as evidence for trade in the Aegean Bronze Age*. Amsterdam: J.C. Gieben, pp. 249–256.

Marthari, M. 2001. Altering information from the past: Illegal excavations in Greece and the case of the Early Bronze Age Cyclades. In: N. Brodie, J. Doole and C. Renfrew (eds.) *Trade in illicit antiquities: the destruction of the world's archaeological heritage*. Cambridge: McDonald Institute for Archaeological Research, pp. 161–172.

Marthari, M. 2008. Aspects of pottery circulation in the Cyclades during the early EB II period. In: N. Brodie, J. Doole, G. Gavalas and C. Renfrew (eds.) *Horizon: A colloquium on the prehistory of the Cyclades*. Cambridge: McDonald Institute for Archaeological Research, pp. 71–84.

Marthari, M. 2009. Middle Cycladic and early Late Cycladic cemeteries and their Minoan elements: The case of the cemetery at Skarkos on Ios. In: C.F. MacDonald, E. Hallager and W.-D. Niemeier (eds.) *The Minoans in the central, eastern and northern Aegean – New evidence* (Monographs of the Danish Institute at Athens, Vol 8). Athens: The Danish Institute at Athens, pp. 41–58.

Marthari, M., T. Marketou, and J.E. Jones. 1990. LB I Ceramic connections between Thera and Kos. In: D.A. Hardy et al. (eds.) *Thera and the Aegean World III. Proceedings of the Third International Congress, Santorini, Greece, 6–9 September, 1989*. London: Thera Foundation, pp. 171–184.

Matsas, D. 1991. Samothrace and the northeastern Aegean: The Minoan connection. *Studia Troica* 1, 159–179.

Matsas, D. 1995. Minoan long-distance trade: A view from the northern Aegean. In: R. Laffineur and W.D. Niemeier (eds.) *Politeia: Society and state in the Aegean Bronze Age*. (Aegaeum 12). Liège: Université de Liège, pp. 235–247.

Mavridis, T. 2007. *A sea of cultures: The Neolithic period on the Aegean islands. Archaeological evidence, theory, interpretation (in Greek)*. Unpublished PhD thesis. National & Kapodistrian University of Athens.

McBirney, A.R. 1998. *Santorini and its eruptions by Ferdinand A. Fouqué*. Baltimore: The Johns Hopkins University Press.

McCoy, F.W. 2009. The eruption within the debate about the date. In: D.A. Warburton (ed.) *Time's up! Dating the Minoan eruption of Santorini* (Monographs of the Danish Institute at Athens 10). Athens: The Danish Institute at Athens, pp. 73–90.

McCoy, F.W. and G. Heiken. 2000. Tsunami generated by the Late Bronze Age eruption of Thera (Santorini), Greece. *Pure and Applied Geophysics* 157, 1227–1256.

McGeehan-Liritzis, V. 1996. *The role and development of metallurgy in the Late Neolithic and Early Bronze Age.* Jonsered: Paul Åström Förlag.

McGeehan-Liritzis, V. and N.H. Gale. 1988. Chemical and lead isotope analyses of Greek Late Neolithic and Early Bronze Age metals. *Archaeometry* 30, 199–225.

McGeorge, P.J.P. 1988. Health and diet in Minoan times. In: R.E. Jones and H.W. Catling (eds.) *New aspects of archaeological science in Greece* (Occasional Papers of the Fitch Laboratory 3). Athens: British School at Athens, pp. 47–54.

McGeorge, P.J.P. 1990. A comparative study of the mean life expectation of the Minoans. In: *Pepragmena tou ST' Diethnous Archaiologikou Synedriou*. Chania: Chrysostomos, pp. 419–428.

McGeorge, P.J.P. 1992. Part II: The burials. In: B.P. Hallager and P.J.P. McGeorge (eds.) *Late Minoan III burials at Khania*. Göteborg: Paul Åström Förlag, pp. 29–44.

McGrail, S. 1987. *Ancient boats in N.W. Europe: The archaeology of water transport to AD 1500*. London/New York: Longman.

McGrail, S. 1991a. Bronze Age seafaring in the Mediterranean: A view from NW Europe. In: N.H. Gale (ed.) *Bronze Age trade in the Mediterranean* (SIMA 90). Jonsered: Paul Åström Förlag, pp. 83–91.

McGrail, S. 1991b. Early sea voyages. *International Journal of Nautical Archaeology* 20, 85–93.

Mediterranean Pilot. 2000. *Aegean sea and approaches with adjacent coasts of Greece and Turkey*. United Kingdom: Hydrographer of the Navy.

Mee, C. 1982. *Rhodes in the Bronze Age. An archaeological survey*. Warminster: Aris & Phillips.

Mee, C. 1988a. A Mycenaean thalassocracy in the eastern Aegean? In: E.B. French and K.A. Wardle (eds.), *Problems in Greek prehistory. Papers presented at the Centenary Conference of the British School at Athens, Manchester April 1986*. Bristol: Bristol Classical Press, pp. 301–306.

Mee, C. 1988b. The LH IIIB period in the Dodecanese. In: S. Dietz (ed.) *Archaeology in the Dodecanese*. Copenhagen. The National Museum of Denmark, pp. 56–58.

Megaloudi, F. 2006. *Plants and diet in Greece from Neolithic to Classic periods* (BAR International Series 1515). Oxford: Archaeopress.

Melas, E.M. 1985. *The islands of Karpathos, Saros and Kasos in the Neolithic and Bronze Age* (SIMA 68). Jonsered: Paul Åström Förlag.

Melas, E.M. 1988. Exploration in the Dodecanese: New prehistoric and Mycenaean finds. *Annual of the British School at Athens* 83, 283–311.

Melas, E.M. 2009. The Afiartis Project: Excavations at the Minoan settlement of Fournoi, Karpathos (2001–2004) – A preliminary report. In: C. Macdonald, E. Hallager and W.D. Niemeier (eds.) *The Minoans in the central, eastern and northern Aegean – New evidence*. Aarhus: Aarhus University Press, pp. 59–72.

Michailidou, A. 1990. The lead weights from Akrotiri: The archaeological record. In: D.A. Hardy et al. (eds.) *Thera and the Aegean World III. Proceedings of the Third International Congress, Santorini, Greece, 6–9 September, 1989*. London: Thera Foundation, pp. 402–419.

Michailidou, A. 2000–1. Indications of literacy in Bronze Age Thera. *Minos* 35–36, 7–30.

Middleton, G.D. 2010. *The collapse of palatial society in LBA Greece and the postpalatial period* (BAR International Series 2110). Oxford: Archaeopress.

Minoura, K., F. Imamura, U. Kuran, T. Nakamura, G.A. Papadopoulos, T. Takashashi and A.C. Yalciner. 2000. Discovery of Minoan tsunami deposits. *Geology* 28, 59–62.

Monaco, G. 1941. Scavi nelle zona Micenea di Jaliso (1933–36). *Clara Rhodos* X, 411–483.

Morgan, L. 1988. *The miniature wall paintings of Thera*. Cambridge: Cambridge University Press.

Morgan, L. 1990. Island iconography: Thera, Kea, Milos. In: D.A. Hardy et al. (eds.) *Thera and the Aegean World III. Proceedings of the Third International Congress, Santorini, Greece, 6–9 September, 1989*. London: Thera Foundation, pp. 252–266.

Morgan, L. 1998. The wall paintings of the North-East Bastion at Ayia Irini, Kea. In: L.G. Mendoni and A.J. Mazarakis Ainian (eds.) *Kea-Kythnos: History and archaeology*. Athens: Research Centre for Greek and Roman Antiquity, pp. 201–210.

Morgan, L. 2007. The painted plasters and their relation to the wall paintings of the Pillar Crypt. In: C. Renfrew et al. (eds.) *Excavations at Phylakopi in Melos, 1974–77* (Suppl. Vol No. 42). London: British School at Athens, pp. 371–399.

Morricone, L. 1972/73. Coo – Scavi e scoperte nel 'Serraglio' e in localita Minori (1935–43). *Annuario della Scuola Archaeologica di Atene* 50/51, 139–396.

Morris, C. and R. Jones. 1998. The Late Bronze Age III town of Ayia Irini and its relations. In: L.G. Mendoni and A.J. Mazarakis Ainian (eds.) *Kea-Kythnos: History and archaeology*. Athens: Research Centre for Greek and Roman Antiquity, pp. 189–199.

Morton, J. 2001. *The role of the physical environment in ancient Greek seafaring*. Leiden: Brill.

Mouliou, M. 1997. *The 'writing' of Classical Archaeology in post-war Greece (1950 to the present). The case of museum exhibitions and museum narratives*. Unpublished PhD thesis. University of Leicester.

Moundrea-Agrafioti, A. 1990. Akrotiri, the chipped stone industry: Reduction techniques and tools of the LCI phase. In: D.A. Hardy et al. (eds.) *Thera and the Aegean World III. Proceedings of the Third International Congress, Santorini, Greece, 6–9 September, 1989*. London: Thera Foundation, pp. 390–406.

Mountjoy, P.A. 1993. *Mycenaean Pottery: An introduction*. Oxford: Oxford University School of Archaeology.

Mountjoy, P.A. 1998. The East Aegean – West Anatolian interface in the Late Bronze Age: Mycenaeans and the Kingdom of Ahhiyawa. *Anatolian Studies* 48, 33–67.

Mountjoy, P.A. and M.J. Ponting. 2000. The Minoan thalassocracy reconsidered: Provenance studies of LH IIA/LM IB pottery from Phylakopi, Ay. Irini and Athens. *Annual of the British School at Athens* 95, 141–184.

Mountjoy, P.E. 1999. *Regional Mycenaean decorated pottery*. Rahden: Verlag Marie Leidorf GmbH.

Mountjoy, P.E. 2008. The Cyclades during the Mycenaean period. In: N. Brodie, J. Doole, G. Gavalas and C. Renfrew (eds.) *Horizon: A colloquium on the prehistory of the Cyclades*. Cambridge: McDonald Institute for Archaeological Research, pp. 467–477.

Murray, J. 1845. *Hand-Book for travellers in the Ionian Islands, Greece, Turkey, Asia Minor and Constantinople*. London: John Murray.

Muscheler, R. 2009. ^{14}C and ^{10}Be around 1650 cal. BC. In: D.A. Warburton (ed.) *Time's up: Dating the Minoan eruption of Santorini*. Athens: Danish Institute at Athens, pp. 275–284.

Mylona, D. 2000. The 'Fishermen' frescoes in the light of the fish bone evidence. In: S. Sherratt (ed.) *The wall paintings of Thera. Proceedings of the First International Symposium, 30 August–4 September 1997, P.M. Nomikos Conference Centre Thera, Hellas*. Athens: Thera Foundation, pp. 561–567.

Mylona, D. 2003. Archaeological fish remains in Greece: General trends of the research and a gazetteer of sites. In: E. Kotjabopoulou et al. (eds.) *Zooarchaeology in Greece: Recent advances*. Athens: British School at Athens, pp. 193–200.

Mylona, D. 2010. Mesolithic fishers at Maroulas, Kythnos: The fish bones. In: Sampson, A., M. Kaczanowska and J.K. Kozlowski (ed.) *The prehistory of the Island of Kythnos (Cyclades, Greece) and the Mesolithic settlement at Maroulas*. Krakow: The Polish Academy of Arts and Sciences/The University of the Aegean, pp. 151–162.

Nelson, D.E., J.S. Vogel and J.R. Southon. 1990. Another suite of confusing radiocarbon dates for the destruction of Akrotiri. In: D.A. Hardy et al. (eds.) *Thera and the Aegean World III. Proceedings of the Third International Congress, Santorini, Greece, 6–9 September, 1989*. London: Thera Foundation, pp. 197–206.

Niemeier, W-D. 1984. The end of the Minoan Thalassocracy. In: R. Hägg and N. Marinatos (eds.) *The Minoan Thalassocracy: Myth and reality. Proceedings of the Third International Symposium at the Swedish Institute in Athens, 31 May–5 June, 1982*. Stockholm: Svenska Institutet i Athen, pp. 205–215.

Niemeier, W-D. 1991. Minoan artisans travelling overseas: The Alalakh frescoes and the painted plaster floor at Tel Kabri (Western Galilee). In: R. Laffineur and L. Basch (eds.) *Thalassa. L'Egéen Prehistorique et la Mer* (Aegaeum 7). Liège: Université de Liège, pp. 189–201.

Nikolakopoulou, I. 2013. Middle Minoan III beyond Crete: The evidence from Thera. In: C.F. MacDonald and C. Knappett (eds.) *Intermezzo. Intermediacy and Regeneration in Middle Minoan III Palatial Crete* (British School at Athens Studies 21). London: British School at Athens, pp. 213–219.

Nikolakopoulou, I., et al. 2008. Trapped in the middle: New stratigraphic and ceramic evidence from Middle Cycladic Akrotiri, Thera. In: N. Brodie, J. Doole, G. Gavalas and C. Renfrew (eds.) *Horizon: A colloquium on the prehistory of the Cyclades*. Cambridge: McDonald Institute for Archaeological Research, pp. 311–324.

Novikova, T., G.A. Papadopoulos and F.W. McCoy. 2011. Modelling of tsunami generated by the giant Late Bronze Age eruption of Thera, South Aegean Sea, Greece. *Geophysical Journal International* 186, 665–680.

Nowicki, K. 2000. *Defensible sites in Crete c. 1200–800 B.C.* Liège: Université de Liège.

Oppenheimer, C. 2003. Climatic, environmental and human consequences of the largest known historic eruption: Tambora volcano (Indonesia) 1815. *Progress in Physical Geography* 27, 230–259.

Oppenheimer, C. 2013. Nature and impacts of the Minoan eruption of Santorini. In: H. Meller, F. Bertemes, H.-R. Bork and R. Risch (eds.) *1600-Cultural change in the shadow of the Thera eruption*. Halle: Landesmuseum für Vorgeschichte, pp. 49–58.

Oustinoff, E. 1984. The manufacture of Cycladic figurines: A practical approach. In: J.L. Fitton (ed.) *Cycladica. Studies in Memory of N.P. Goulandris*. London: British Museum, pp. 38–47.

Overbeck, J.C. 1982. The hub of commerce in Keos and Middle Helladic Greece. *Temple University Aegean Symposium* 7, 38–49.

Overbeck, J.C. 1984. Stratigraphy and ceramic sequence in Middle Cycladic Ayia Irini, Kea. In: J.A. MacGillivray and R.L.N. Barber (eds.) *The Prehistoric Cyclades*. Edinburgh: Department of Classical Archaeology, University of Edinburgh, pp. 108–113.

Overbeck, J.C. 1989. *Keos VII. Ayia Irini: Period IV*. Mainz: von Zabern.

Owens, G. 1997. Further comments on the Linear A inscriptions from Thera. *Kadmos* 36, 172–173.

Özdogan, M. 2005. Westward expansion of the Neolithic way of life: What we know and what we do not know. In: C. Lichter (ed.) *How did farming reach Europe?* Istanbul: Deutsches Archäologisches Institut, pp. 13–28.

Özgüc, T. 1964. The Art and architecture of ancient Kanesh. *Anatolia* 8, 27–30.

Palaima, T.G., 1982. Linear A in the Cyclades: the trade and travel of a script. *Temple University Aegean Symposium* 7, 15–22.

Palyvou, C. 2005. *Akrotiri Thera: An architecture of affluence 3,500 years old*. Philadelphia: INSTAP Academic Press.

Papadatos, Y. 2007. Beyond cultures and ethnicity: A new look at material culture distribution and inter-regional interaction in the Early Bronze Age southern Aegean. In: S. Antoniadou and A. Pace (eds.) *Mediterranean crossroads*. Athens: Pierides Foundation, pp. 419–451.

Papadopoulos, S. 2008. Silver and copper production practices in Thasos. In: I. Tzachili (ed.) *Aegean metallurgy in the Bronze Age*. Athens: Ta Pragmata Publications, pp. 59–67.

Papadopoulos, S. and D. Malamidou. 2008. Limenaria, a Neolithic and Early Bronze Age settlement at Thasos. In: H. Erkanal, H. Hauptmann, V. Sahoglu and Riza Tuncel (eds.) *The Aegean in the Neolithic, Chalcolithic and the Early Bronze Age*. Ankara: Ankara University, pp. 427–445.

Papadopoulos, J.K. 1996. Dark Age Greece. In: B.M. Fagan (ed.) *The Oxford companion to Archaeology*. Oxford: Oxford University Press, pp. 253–255.

Papadopoulou, Z.D. 2011. Akrotiraki and Skali: New evidence for EBA lead/silver and copper production from southern Siphnos. In: P.P. Betancourt and S.C. Ferrence (eds.) *Metallurgy: Understanding how, learning why. Studies in Honor of James D. Muhly*. Philadelphia: INSTAP Academic Press, pp. 149–156.

Papageorgiou, I. 2000. On the *Rites de Passage* in Late Cycladic Akrotiri, Thera: A reconsideration of the frescoes of the 'Priestess' and the 'Fishermen' of the West House. In: S. Sherratt (ed.) *The wall paintings of Thera. Proceedings of the First International Symposium, 30 August–4 September 1997*. Athens: Thera Foundation, pp. 958–969.

Papagiannopoulou, A.G. 1990. Some changes in the BA pottery production at Akrotiri and their possible implications. In: D.A. Hardy et al. (eds.) *Thera and the Aegean World III. Proceedings of the Third International Congress, Santorini, Greece, 6–9 September*, *1989*. London: Thera Foundation, pp. 57–66.

Papagiannopoulou, A.G. 1991. *The influence of Middle Minoan pottery on the Cyclades*. Göteborg: Aströms.

Papathanasiou, A. 2003. Stable isotope analysis in Neolithic Greece and possible implications on human health. *International Journal of Osteoarchaeology* 13, 314–324.

Papathanasiou, A. 2015. Stable isotope analyses in Neolithic and Bronze Age Greece: An overview. In: A. Papathanasiou, M.P. Richards and S.C. Fox (eds.) *Archaeodiet in the Greek world*. Athens: American School of Classical Studies, pp. 25–56.

Patton, M. 1996. *Islands in time*. London: Routledge.

Payne, S. 1973a. Kill-off patterns in sheep and goats: the mandibles from Aşvan Kalé. *Anatolia Studies* 23, 281–303.

Payne, S. 1973b. Animal bones: Excavation in the Franchthi Cave 1969–1971. *Hesperia* 42, 59–66.

Payne, S. 1975. Faunal Change at Franchthi Cave from 20,000 B.C. to 3,000 B.C. In: A.T. Clason (ed.) *Archaeozoological studies*. New York: Elsevier, pp. 120–131.

Payne, S. 1982. Faunal evidence for environmental/climatic change at Franchthi Cave (southern Argolid, Greece), 25,000 BP to 5,000 BP – preliminary results. In: J.L. Bintliff and W. Van Zeist (eds.) *Palaeoclimates, palaeoenvironments and human communities in the Eastern Mediterranean region in later prehistory*. Vol. 1. (BAR International Series 133). Oxford: British Archaeological Reports, pp. 133–143.

Pearce, N.J.G., J.A. Westgate, S.J. Preece, W.J. Eastwood and W.T. Perkins. 2004. Identification of Aniakchak (Alaska) tephra in Greenland ice core challenges the 1645 BC date for Minoan eruption of Santorini. *G3: Geochemistry, Geophysics, Geosystems* 5, 1–10.

Pearson, C.L., D.S. Dale, P.W. Brewer, P.I. Kuniholm, J. Lipton and S.W. Manning. 2009. Dendrochemical analysis of a tree-ring growth anomaly associated with the Late Bronze Age eruption of Thera. *Journal of Archaeological Science* 36, 1206–1214.

Peatfield, A.A.D. 1983. The topography of Minoan peak sanctuaries. *Annual of the British School at Athens* 78, 273–279.

Pelon, O. 1998. Les tombes circulaires dans l'Égée, de l'âge du Bronze: état des recherches sur les tombes à Tholos. *Topoi* 4, 153–207.

Pemble, J. 1987. *The Mediterranean passion*. Oxford: Clarendon Press.

Perdikatsis, V., V. Kilikoglou, S. Sotiropoulou and E. Chryssikopoulou. 2000. Physicochemical characterization of pigments from Theran wall paintings. In: S. Sherratt (ed.) *The Wall Paintings of Thera. Proceedings of the First International Symposium, 30 August–4 September 1997*. Athens: Thera Foundation, pp. 103–118.

Perlès, C. 1987. *Les industries lithiques taillées de Franchthi (Argolide, Grèce). Vol. 1: Présentation générale et industries Paléolithiques* (Excavations at Franchthi Cave, Greece Fascicle 3). Bloomington: Indiana University Press.

Perlès, C. 1990. *Les industries lithiques taillées de Franchthi (Argolide, Grèce). Vol. 2: Les industries du Mésolithique et du Néolithique Initial* (Excavations at Franchthi Cave, Greece Fascicle 3). Bloomington: Indiana University Press.

Perlès, C. 1999. Long-term perspectives on the occupation of the Franchthi Cave: Continuity and discontinuity. In: G.N. Bailey, E. Adam, E. Panagopoulou, C. Perlès, and K. Zachos (eds.) *The Palaeolithic archaeology of Greece and adjacent areas* (BSA Studies 3). London: British School at Athens, pp. 311–318.

Perlès, C. 2001. *The early Neolithic in Greece: the first farming communities in Europe*. Cambridge: Cambridge University Press.

Perlès, C. 2005. From the Near East to Greece: Let's reverse the focus – Cultural elements that didn't transfer. In: C. Lichter (ed.) *How did farming reach Europe?* Istanbul: Deutsches Archäologisches Institut, pp. 275–290.

Perlès, C. and K.D. Vitelli. 1999. Craft specialization in the Neolithic of Greece. In: C. Perlès and K.D. Vitelli (eds.) *Neolithic society in Greece*. Sheffield: Sheffield Academic Press, pp. 96–107.

Pernicka, E., F. Begemann, S. Schmitt-Strecker and A.P. Grimanis. 1990. On the composition and provenance of metal artefacts from Poliochni on Lemnos. *Oxford Journal of Archaeology* 9, 263–298.

Peterson Murray, S. 2004. Reconsidering the Room of the Ladies at Akrotiri. In: A. Chapin (ed.) *CHARIS: Essays in Honor of Sara A. Immerwahr* (Hesperia Supplement 33). Princeton: Princeton University Press, pp. 101–130.

Petruso, K.M. 1978. Lead weights from Akrotiri: Preliminary observations. In: C.G. Doumas (ed.) *Thera and the Aegean World. Papers Presented at the Second International Scientific Congress, Santorini, Greece, August 1978*. London: Thera Foundation, pp. 547–553.

Petruso, K.M. 1992. *Keos VIII. Ayia Irini: The balance weights*. Mainz: von Zabern.

Phelps, W., Y.G. Lolos and Y. Vichos (eds.). 1999. *The Point Iria Wreck: interconnections in the Mediterranean ca. 1200 BC*. Athens: Hellenic Institute of Marine Archaeology.

Philaniotou, O., Y. Bassiakos and M. Georgakopoulou. 2011. Early Bronze Age copper smelting on Seriphos (Cyclades, Greece). In: P.P. Betancourt and S.C. Ferrence (eds.) *Metallurgy: Understanding how, learning why. Studies in Honor of James D. Muhly*. Philadelphia: INSTAP Academic Press, pp. 157–164.

Philippaki, B. 1973. I Akropolis tou Ayiou Andreou Siphnou. *AAA* 6, 93–103.

Phoca-Cosmetatou, N. 2008. Economy and occupation in the Cyclades during the Late Neolithic: The example of Ftelia, Mykonos. In: N. Brodie, J. Doole, G. Gavalas and C. Renfrew (eds.) *Horizon: A colloquium on the prehistory of the Cyclades*. Cambridge: McDonald Institute for Archaeological Research, pp. 37–41.

Phoca-Cosmetatou, N. 2011. Initial occupation of the Cycladic islands in the Neolithic: Strategies for survival. In: N. Phoca-Cosmetatou (ed.) *The first Mediterranean islanders*. Oxford: Oxford University, pp. 77–97.

Phoca-Cosmetatou, N. and R.J. Rabett. 2014. Reflections on Pleistocene island occupation. *Journal of Mediterranean Archaeology* 27, 255–278.

Powell, J. 1996. *Fishing in the prehistoric Aegean*. Jonsered: Paul Åström Förlag.

Powell, J. 2003. Fishing in the Mesolithic and Neolithic – The Cave of Cyclops, Youra. In: E. Kotjabopoulou et al. (eds.) *Zooarchaeology in Greece: Recent advances*. Athens: British School at Athens, pp. 75–84.

Privitera, S. 2005. Hephaestia on Lemnos and the Mycenaean presence in the islands of the northeastern Aegean. In: R. Laffineur and E. Greco (eds.) *Emporia: Aegeans in the Central Mediterranean* (Aegaeum 25). Liège: Université de Liège, pp. 227–236.

Protonotariou-Deilaki, E. 1971. Argos. *Archaiologikon Deltion* 28(B'1). *Chronika*, 90–94.

Pullen, D.J. 1992. Ox and plow in the Early Bronze Age Aegean. *American Journal of Archaeology* 96, 45–54.

Pullen, D.J. 2013. "Minding the gap": Bridging the gaps in cultural change within the Early Bronze Age Aegean. *American Journal of Archaeology* 117, 545–553.

Pyle, D.M. 1997. The global impact of the Minoan eruption of Santorini, Greece. *Environmental Geology* 30, 59–61.

Rackham, O. 1990. Observations on the historical ecology of Santorini. In: D.A. Hardy, C.G. Doumas, J.A. Sakellarakis and P.M. Warren (eds.) *Thera and the Aegean World III. Vol. 1. Proceedings of the Third International Congress, Santorini, Greece, 6–9 September, 1989*. London: Thera Foundation, pp. 384–391.

Rainbird, P. 1999. Islands out of time: Towards a critique of island archaeology. *Journal of Mediterranean Archaeology* 12, 216–234.

Rambach, J. 2000. *Kykladen: Die frühe Bronzezeit Grab-und Siedlungsbefunde*. Bonn: R. Habelt. 2 volumes.

Randolph, B. 1687. *The present state of the islands in the archipelago*. Oxford: Oxford University Press.

Rapp, G. and J.C. Kraft. 1978. Aegean sea level changes in the Bronze Age. In: C.G. Doumas (ed.) *Thera and the Aegean World. Papers Presented at the Second International Scientific Congress, Santorini, Greece, August 1978*, 1. London: Thera Foundation, pp. 183–194.

Reese, D.S. 1987. Palaikastro shells and Bronze Age purple-dye production in the Mediterranean basin. *Annual of the British School at Athens* 82, 201–206.

Rehak, P. and J.G. Younger. 1998. Review of Aegean prehistory VII: Neopalatial, Final Palatial, and Postpalatial Crete. *American Journal of Archaeology* 102, 91–173.

Reingruber, A. 2011. Early Neolithic settlement patterns and exchange networks in the Aegean. *Documenta Praehistorica* 38, 291–305.

Reingruber, A. and L. Thissen. 2009. Depending on ^{14}C data: Chronological framework in the Neolithic and Chalcolithic of southeastern Europe. *Radiocarbon* 51, 751–770.

Renfrew, C. 1969. The development and chronology of the Early Cycladic figurines. *American Journal of Archaeology* 73, 1–32.

Renfrew, C. 1972. *The Emergence of civilisation*. London: Methuen.

Renfrew, C. 1982. Bronze Age Melos. In: A.C. Renfrew and J.M. Wagstaff (eds.) *An island polity: The archaeology of exploitation in Melos*. Cambridge: Cambridge University Press, pp. 35–44.

Renfrew, C. 1984. Speculations on the use of Early Cycladic sculpture. In: J.L. Fitton (ed.) *Cycladica: Studies in memory of N.P. Goulandris*. London: British Museum Press, pp. 24–30.

Renfrew, C. 1991. *The Cycladic spirit*. London: Thames & Hudson.

Renfrew, C. 1993. Trade beyond the material. In: C. Scarre and F. Healy (eds.) *Trade and exchange in prehistoric Europe*. Oxford: Oxbow Books, pp. 5–16.

Renfrew, C. 2007. Dhaskalio Kavos as symbolic attractor. In: C. Renfrew, C. Doumas, L. Marangou and G. Gavalas (eds.) *Keros, Dhaskalio Kavos. The investigations of 1987–88*. Cambridge. McDonald Institute for Archaeological Research, pp. 429–442.

Renfrew, C. 2008. The Keros Hoard: Remaining questions. *American Journal of Archaeology* 112, 295–298.

Renfrew, C. 2013. The role of the settlement at Dhaskalio: an overview. In: C. Renfrew, O. Philaniotou, N. Brodie, G. Gavalas and M. Boyd (eds.) *The settlement at Dhaskalio (Vol 1). The sanctuary on Keros and the origins of Aegean ritual practice: The excavations of 2006–2008*. Cambridge: McDonald Institute for Archaeological Research, pp. 705–724.

Renfrew, C., Philaniotou, O., Brodie, N., Gavalas, G. and M. Boyd (eds.) *Kavos and the Special Deposits (Vol 2). The Sanctuary on Keros and the origins of Aegean ritual practice: The excavations of 2006–2008*. Cambridge: McDonald Institute for Archaeological Research.

Renfrew, C. 2017. Cycladic figurines. In: T. Insoll (ed.) *Oxford handbook of prehistoric figurines*. Oxford: Oxford University Press, pp. 637–658.

Renfrew, C., M. Boyd and C. Bronk Ramsey. 2012. The oldest maritime sanctuary? Dating the sanctuary at Keros and the Cycladic Early Bronze Age. *Antiquity* 86, 144–160.

Renfrew, C., J.R. Cann and J.E. Dixon. 1965. Obsidian in the Aegean. *Annual of the British School at Athens* 60, 225–247.

Renfrew, C., C. Doumas, L. Marangou and G. Gavalas. 2007b. *Keros, Dhaskalio Kavos: The investigations of 1987–88*. Cambridge: McDonald Institute for Archaeological Research.

Renfrew, C., O. Philaniotou, N. Brodie, G. Gavalas and M. Boyd. 2013. *The settlement at Dhaskalio (Vol 1). The sanctuary on Keros and the origins of Aegean ritual practice: the excavations of 2006–2008*. Oxford: McDonald Institute for Archaeological Research.

Renfrew, C. and J.M. Wagstaff (eds.) 1982. *An island polity: The archaeology of exploitation in Melos*. Cambridge: Cambridge University Press.

Renfrew, C. et al. 1985. *The archaeology of cult: The Sanctuary at Phylakopi*. London: British School at Athens.

Renfrew, C. et al. 2007a. *Excavations at Phylakopi in Melos, 1974–77* (Suppl. Vol No. 42). London: British School at Athens.

Renfrew, J.M. 2006. The carbonised seeds. In: L. Marangou, C. Renfrew, C. Doumas and G. Gavalas (eds.) *Markiani, Amorgos: An Early Bronze Age fortified settlement* (Suppl Vol 40). London: British School at Athens, pp. 245–246.

Riedesel, J.H. von. 1774. *Bemerkungen auf einer Reise nach der Levante*. Leipzig: Nicolai.

Riley, F.R. 1999. *The role of the traditional Mediterranean diet in the development of Minoan Crete* (BAR International Series 810). Oxford: Archaeopress.

Ritner, R.K. and N. Moeller. 2014. The Ahmose 'Tempest Stela', Thera and comparative chronology. *Journal of Near Eastern Studies* 73, 1–19.

Roberts, O.T.P. 1991. The development of the brail into a viable sail control for Aegean boats of the Bronze Age. In: R. Laffineur and L. Basch (eds.) *Thalassa. L'Egéen Prehistorique et la Mer* (Aegaeum 7). Liège: Université de Liège, pp. 55–60.

Rockman, M. 2003. Knowledge and learning in the archaeology of colonization. In: M. Rockman and J. Steele (eds.) *Colonization of unfamiliar landscapes: The archaeology of adaptation*. London: Routledge, pp. 3–24.

Roffet-Salque, M. et al. 2015. Widespread exploitation of the honeybee by early Neolithic farmers. *Nature* 527, 226–231.

Rose, M. 1994. *With line and glittering bronze hook: Fishing in the Aegean Bronze Age*. Unpublished PhD thesis. Indiana University.

Rose, M. 1995. Fishing at Franchthi cave, Greece: Changing environments and patterns of exploitation. *Old World Archaeology Newsletter* 18, 21–26.

Rubensohn, O. 1917. Die prähistorischen und frühgeschichtlichen Funde auf dem Burghügel von Paros. *Mitteilungen des Deutschen Archäologischen Instituts: Athenische Abteilung* 42, 1–98.

Runnels, C.N. 1995. Review of Aegean prehistory IV: The Stone Ages of Greece from the Palaeolithic to the advent of the Neolithic. *American Journal of Archaeology* 99, 699–728.

Runnels, C.N. 1996. The Palaeolithic and Mesolithic remains. In: B. Wells (ed.) *The Berbati-Limnes Archaeological Survey 1988–1990* (Skrifter Utgivna av Svenska Institutet I Athen XLIV). Stockholm: Paul Aströms, pp. 23–35.

Runnels, C.N. 2009. Mesolithic sites and surveys in Greece: A case study from the southern Argolid. *Journal of Mediterranean Archaeology* 22, 57–73.

Runnels, C.N. 2014. Early Palaeolithic on the Greek islands? *Journal of Mediterranean Archaeology* 27, 211–230.

Runnels, C.N. and J. Hansen. 1986. The olive in the prehistoric Aegean: The evidence for domestication in the Early Bronze Age. *Oxford Journal of Archaeology* 5, 299–308.

Ruscillo, D. 2006. Faunal remains and murex dye production. In: J.W. Shaw and M.C. Shaw (eds.) *Kommos V: The monumental Minoan buildings at Kommos*. Princeton, NJ: Princeton University Press, pp. 776–844.

Rutkowski, B. 1986. *The cult places of the Aegean*. New Haven: Yale University Press.

Rutter, J.B. 1983. Some observations on the Cyclades in the later third and early second millennia. *American Journal of Archaeology* 87, 69–76.

Rutter, J.B. 1992. Cultural novelties in the post-palatial Aegean world: Indices of vitality or decline? In: W.A. Ward and M. Joukowsky (eds.) *The crisis years: The 12th century BC: From beyond the Danube to the Tigris*. Dubuque. Kendall/Hunt Publishing, pp. 61–78.

Sahlins, M.D. 1955. Esoteric efflorescence in Easter Island. *American Anthropologist* 57, 1045–1052.

Sakellarakis, G. 2011. *Kythira: to Minoiko iero koryphis ston Ayio Georgio sto Vouno. Vol. 1*. Athens. Athenian Archaeological Association.

Sakellarakis, Y. 1996. Minoan religious influence in the Aegean: The case of Kythera. *Annual of the British School at Athens* 91, 81–99.

Sali-Axioti, T. 1990. The lightwell of the House of the Ladies and its structural behaviour. In: D.A. Hardy *et al*. (eds.) *Thera and the Aegean World III*. *Proceedings of the Third International Congress, Santorini, Greece, 6–9 September, 1989*. London: Thera Foundation, pp. 437–440.

Salzer, M.W. and M.K. Hughes. 2007. Bristlecone pine tree rings and volcanic eruptions over the last 5000 yr. *Quaternary Research* 67, 57–68.

Sampson, A. 1984. The Neolithic of the Dodecanese and Aegean Neolithic. *Annual of the British School at Athens* 79, 239–249.

Sampson, A. 2002. *The Neolithic settlement at Ftelia, Mykonos*. Rhodes: University of the Aegean.

Sampson, A. 2008a. *The Cave of the Cyclops. Vol. 1*. Philadelphia: INSTAP Academic Press.

Sampson, A. 2008b. From the Mesolithic to the Neolithic: New data on Aegean prehistory. In: H. Erkanal, H. Hauptmann, V. Sahoglu and R. Tuncel (eds.) *The Aegean in the Neolithic, Chalcolithic and the Early Bronze Age*. Ankara: Ankara University, pp. 503–516.

Sampson, A. 2008c. The architectural phases of the Neolithic settlement of Ftelia on Mykonos. In: N. Brodie, J. Doole, G. Gavalas and C. Renfrew (eds.) *Horizon: A colloquium on the prehistory of the Cyclades*. Cambridge: McDonald Institute for Archaeological Research, pp. 29–36.

Sampson, A. 2011. *The Cave of the Cyclops. Vol. 2*. Philadelphia: INSTAP Academic Press.

Sampson, A. 2016. An extended Mesolithic settlement in Naxos, *Mediterranean Archaeology and Archaeometry* 16, 269–271.

Sampson, A., M. Kaczanowska and J.K. Kozlowski. 2010. *The prehistory of the island of Kythnos (Cyclades, Greece) and the Mesolithic settlement at Maroulas*. Krakow: The Polish Academy of Arts and Sciences/The University of the Aegean.

Sampson, A., M. Kaczanawska and J.K. Kozlowski. 2012. Mesolithic occupations and environments on the island of Ikaria, Aegean, Greece. *Versita* 80, 5–40.

Santerre, H.G. de. 1958. *Délos primitive et archaïque*. Paris: de Boccard.

Sapouna-Sakellarakis, E., G. Sakellarakis, G. Vapouphakis and A. Banou. 2012. *Kythira: to Minoiko iero koryphis ston Ayio Georgio sto Vouno. Vol. 2*. Athens: Athenian Archaeological Association.

Sarpaki, A. 1992a. The palaeoethnobotanical approach. The Mediterranean triad or is it a quartet? In: B. Wells (ed.) *Agriculture in Ancient Greece*. *Proceedings of the 7th International Symposium at the Swedish Institute at Athens, 16–17 May, 1990*. Stockholm: Paul Åström Förlag, pp. 61–75.

Sarpaki, A. 1992b. A palaeoethnobotanical study of the West House, Akrotiri, Thera. *Annual of the British School at Athens* 87, 219–230.

Sarpaki, A. 2001. Processed cereals and pulses from the Late Bronze Age site of Akrotiri, Thera: Preparations prior to consumption: A preliminary approach to their study. *Annual of the British School at Athens* 96, 27–40.

Savari, C.E.M. 1788. *Letters on Greece.* Dublin: Publisher Unknown.

Schallin, A.L. 1993. *Islands under influence. The Cyclades in the Late Bronze Age and the nature of the Mycenaean presence*. Jonsered: Paul Åström Förlag.

Schallin, A.L. 1998. The nature of Mycenaean presence and peer polity interaction in the Late Bronze Age Cyclades. In: L.G. Mendoni and A.J. Mazarakis Ainian (eds.) *Kea-Kythnos: History and archaeology*. Athens: Research Centre for Greek and Roman Antiquity, pp. 175–187.

Schilardi, D.U. 1979. The destruction of the Mycenaean citadel at Koukounaries on Paros. In: J.L. Davis and J.F. Cherry (eds.) *Papers in Cycladic prehistory*. Los Angeles: Institute of Archaeology, pp. 158–179.

Schilardi, D.U. 1984. The LH IIIC period at the Koukounaries Acropolis, Paros. In: J.A. MacGillivray and R.L.N. Barber (eds.) *The prehistoric Cyclades*. Edinburgh: Department of Classical Archaeology, pp. 184–206.

Schilardi, D.U. 1992. Paros and the Cyclades after the fall of the Mycenaean palaces. In: J.-P. Olivier (ed.) *Mykenaïka. Actes du IX Colloque International sur les Texts Mycéniens et Égéens, Athènes, 2–6 Octobre, 1990*. Paris: Boccard, pp. 621–639.

Schofield, E. 1990. Evidence for household industries on Thera and Keos. In: D.A. Hardy et al. (eds.) *Thera and the Aegean World III. Proceedings of the Third International Congress, Santorini, Greece, 6–9 September, 1989*. London: Thera Foundation, pp. 201–211.

Schofield, E. 1998. Town planning at Ayia Irini, Kea. In: L.G. Mendoni and A.J. Mazarakis Ainian (eds.) *Kea-Kythnos: History and archaeology*. Athens: Research Centre for Greek and Roman Antiquity, pp. 117–121.

Schofield, E., J.L. Davis, C. Hershenson, W. Powell-Cummer. 2011. *Keos X: Ayia Irini. The western sector*. Darmstadt: von Zabern.

Scholes, K. 1956. The Cyclades in the Late Bronze Age: A synopsis. *Annual of the British School at Athens* 51, 9–40.

Self, S. 2006. The effects and consequences of very large explosive volcanic eruptions. *Philosophical Transactions of the Royal Society A* 364, 2073–2097.

Severin, T. 1985. *The Jason voyage*. London: Lutchinson.

Severin, T. 1987. *The Ulysses voyage*. London. Hutchinson.

Shaw, J.W. 1987. The Early Helladic II corridor house: Development and form. *American Journal of Archaeology*, 59–79.

Shaw, J.W. 1990. Bronze Age Aegean harboursides. In: D.A. Hardy, C.G. Doumas, J.A. Sakellarakis and P.M. Warren (eds.) *Thera and the Aegean World III. Vol. 1. Proceedings of the Third International Congress, Santorini, Greece, 6–9 September, 1989*. London: Thera Foundation, pp. 420–436.

Shelmerdine, C. (ed.). 2008. *The Cambridge companion to the Aegean Bronze Age*. Cambridge: Cambridge University Press

Shelton, K. 2010. Late Bronze Age mainland Greece. In: E. Cline (ed.) *The Oxford handbook of the Bronze Age Aegean*. Oxford: Oxford University Press, pp. 139–138.

Sherratt, A. 1981. Plough and pastoralism: Aspects of the secondary products revolution. In: I. Hodder (ed.) *Patterns of the past: Studies in honour of David Clarke*. Cambridge: Cambridge University Press, pp. 261–305.

Sherratt, S. (ed.). 2000a. *The wall paintings of Thera. Proceedings of the First International Symposium, 30 August–4 September 1997*. Athens: Thera Foundation.

Sherratt, S. 2000b. *Catalogue of Cycladic antiquities in the Ashmolean Museum. The captive spirit*. Oxford: Ashmolean Museum Press.

Sherratt, S. 2007. The archaeology of metal use in the Early Bronze Age: A review. In: P.M. Day and R.C.P. Doonan (eds.) *Metallurgy in the Early Bronze Age*. Oxford: Oxbow Books, pp. 245–263.

Sherratt, S. 2011. Learning to learn from Bronze Age pots: A perspective on forty years of Aegean ceramic studies in the work of J.B. Rutter. In: W. Gauss, M. Lindblom, R.A.K. Smith and J.C. Wright (eds.) *Our cups are full: Pottery and society in the Aegean Bronze Age*. Oxford: Oxford University Press, pp. 257–266.

Sigurdsson, H. et al. 2006. Marine investigations of Greece's Santorini volcanic field. *EOS* 87, 337–348.

Sigurdsson, H., S. Carey and J.D. Devine. 1990. Assessment of mass, dynamics and environmental effects of the Minoan eruption of Santorini volcano. In: D.A. Hardy et al. (eds.) *Thera and the Aegean World III. Proceedings*

of the Third International Congress, Santorini, Greece, 6–9 September, 1989. London: Thera Foundation, pp. 100–112.

Simberloff, D.S. 1974. Equilibrium theory of island biogeography and ecology. *Annual Review of Ecology and Systematics* 5, 161–182.

Simkin, T. and L. Siebert, 1994. *Volcanoes of the world*. 2nd ed. Tucson: Geoscience Press.

Slot, J. 1982. *Archipelagus Turbatus. Les Cyclades entre colonisation Latine et occupation Ottomane. c.1500–1718*. Istanbul.

Snodgrass, A. 1971. *The Dark Age of Greece*. Edinburgh: Edinburgh University Press.

Sonnini, C.S. 1801. *Voyage en Grèce et en Turquie. 2 vols*. Paris: Buisson.

Sordinas, A. 1969. Investigations of the prehistory of Corfu during 1964–1966. *Balkan Studies* 10, 393–424.

Sotirakopoulou, P. 1996. The dating of the Late Phylakopi I as evidenced at Akrotiri on Thera. *Annual of the British School at Athens* 91, 113–136.

Sotirakopoulou, P. 1998. The Early Bronze Age stone figurines from Akrotiri on Thera and their significance for the Early Cycladic settlement. *Annual of the British School at Athens* 93, 107–165.

Sotirakopoulou, P. 1999. Akrotiri Theras: i Neolithiki kai i Proimi Epochi tou Chalkou epiti vasi tis keramikis. Athens: Library of the Archaeological Society at Athens.

Sotirakopoulou, P. 2005. *The "Keros Hoard". Myth or reality?* Athens: Goulandris Foundation.

Sotirakopoulou, P. 2008. Akrotiri, Thera: The Late Neolithic and Early Bronze Age phases in the light of recent excavations at the site. In: N. Brodie, J. Doole, G. Gavalas and C. Renfrew (eds.) *Horizon: A colloquium on the prehistory of the Cyclades*. Cambridge: McDonald Institute for Archaeological Research, pp. 121–134.

Sotirakopoulou, P. 2010. The Cycladic Middle Bronze Age: A "Dark Age' in Aegean prehistory or a dark spot in archaeological research? In: A. Philippa-Touchais, G. Touchais, S. Vousaki and J. Wright (eds.) *Mesohelladica. The Greek Mainland in the Middle Bronze Age.* Athens: École Française d'Athènes, pp. 825–839.

Souyoudzoglou-Haywood, C. 1999. *The Ionian islands in the Bronze Age and Early Iron Age, 3000–800 BC*. Liverpool: Liverpool University Press.

Spon, J. 1724. *Voyage d'Italie, de Dalmatie, de Grèce, et du Levant, fait és années 1675 et 1676 par Jacob Spon et George Wheler. 2 vols*. Lyons: Cellier.

Stanley, D.J. and H. Sheng. 1986. Volcanic shards from Santorini (Upper Minoan ash) in the Nile Delta, Egypt. *Nature* 320, 733–735.

Starr, C.G. 1954/55. The myth of the Minoan thalassocracy. *Historia* 3, 282–237.

Sterba, J.H., K. Polinger Foster, G. Steinhauser and M. Bichler. 2009. New light on old pumice: The origins of Mediterranean volcanic material from ancient Egypt. *Journal of Archaeological Science* 36, 1738–1744.

Stiner, M.C. and N.D. Munro. 2011. On the evolution of diet and landscape during the Upper Paleolithic through Mesolithic at Franchthi Cave (Peloponnese, Greece). *Journal of Human Evolution* 60, 618–636.

Stoddart, S., A. Bonanno, T. Gouder, C. Malone and D. Trump. 1993. Cult in an island society: Prehistoric Malta in the Tarxien period. *Cambridge Archaeological Journal* 3, 3–19.

Stos-Gale, A. 2007. Appendix L. Report on Analyses of lead, litharge and tin. In: C. Renfrew et al. (eds.) *Excavations at Phylakopi in Melos, 1974–77* (Suppl. Vol No. 42). London: British School at Athens, pp. 460–464.

Stos-Gale, S. 1998. The role of Kythnos and other Cycladic islands in the origins of Early Minoan metallurgy. In: L.G. Mendoni and A.J. Mazarakis Ainian (eds.) *Kea-Kythnos: History and archaeology*. Athens: Research Centre for Greek and Roman Antiquity, pp. 717–736.

Stos-Gale, Z.A. and N.H. Gale. 1990. The role of Thera in the Bronze Age trade in metals. In: D.A. Hardy et al. (eds.) *Thera and the Aegean World III. Proceedings of the Third International Congress, Santorini, Greece, 6–9 September, 1989*. London: Thera Foundation, pp. 72–89.

Stos-Gale, Z.A. and N.H. Gale. 2003. Lead isotopic and other isotopic research in the Aegean. In: Foster, K.P. and R. Laffineur (eds.) *Metron: Measuring the Aegean Bronze Age* (Aegaeum 24). Liège: Université de Liège/, pp. 24, 83–101.

Stos-Gale, Z.A., N.H. Gale and G.R. Gilmore. 1984. Early Bronze Age Trojan metal sources and Anatolians in the Cyclades. *Oxford Journal of Archaeology* 3, 23–44.

Stos-Gale, Z.A. and C.F. Macdonald. 1991. Sources of metals and trade in the Bronze Age Aegean. In: N.H. Gale (ed.) *Bronze Age Trade in the Mediterranean. Papers Presented at the Conference Held at Rewley House, Oxford in December 1989* (SIMA 90). Jonsered: Paul Åström Förlag, pp. 249–289.

Strang, V. 2004. *The meaning of water*. Berg: Oxford.

Strasser, T.F., et al. 2011. Dating Palaeolithic sites in southwestern Crete, Greece. *Journal of Quaternary Science* 26, 553–560.

Strasser, T.F., et al. 2010. Stone Age seafaring in the Mediterranean: Evidence from the Plakias region for Lower Palaeolithic and Mesolithic habitation of Crete. *Hesperia* 79, 145–190.

Struys, J. 1683. *The perilous and most unhappy voyages of John Struys*. London: Samuel Smith.

Symons, G.J. 1888. *The eruption of Krakatoa and subsequent phenomena*. London: Harrison & Sons.

Talalay, L.E. 1993. *Deities, dolls, and devices. Neolithic figurines from Franchthi Cave, Greece. Excavations at Franchthi Cave, Greece*. Fasc. 9. Bloomington: Indianapolis.

Tambakopoulos, D. and Y. Maniatis. 2009. The search for the prehistoric marbles sources in the Cyclades. In: A. Gutiérrez Garcia-M., P. Lapuente Mercadal and I. Rodà de Llanza (eds.) *Interdisciplinary studies on ancient stone*. Tarragona: Institute Català d'Arqueologia Clàssica, pp. 287–299.

Tartaron, T.F. et al. 2006. The Eastern Korinthia Archaeological Survey. *Hesperia* 75, 453–523.

Taylor, R.E. and O. Bar-Yosef. 2014. *Radiocarbon dating: An archaeological perspective.* 2nd ed. Walnut Creek, CA: Left Coast Press.

Televantou, C.A. 1990. New light on the West House wall-paintings. In: D.A. Hardy et al. (eds.) *Thera and the Aegean World III. Proceedings of the Third International Congress, Santorini, Greece, 6–9 September, 1989*. London: Thera Foundation, pp. 309–324.

Televantou, C.A. 2000. Aegean Bronze Age wall painting: The Theran workshop. In: S. Sherratt (ed.) *The wall paintings of Thera*. *Proceedings of the First International Symposium, 30 August–4 September 1997*. Athens: Thera Foundation, pp. 831–843.

Televantou, C.A. 2001. Ayios Andreas on Sifnos: A Late Cycladic III fortified acropolis. In: V. Karageorghis and C.E. Morris (eds.) *Defensive settlements of the Aegean and the eastern Mediterranean after c. 1200 BC*. Nicosia: Trinity College Dublin and Anastasios G. Leventis Foundation, pp. 191–214.

Televantou, C.A. 2008a. Strofilas: A Neolithic settlement on Andros. In: N. Brodie, J. Doole, G. Gavalas and C. Renfrew (eds.) *Horizon: A colloquium on the prehistory of the Cyclades*. Cambridge: McDonald Institute for Archaeological Research, pp. 43–53.

Televantou, C.A. 2008b. The early Cycladic cemetery at Rivari on Melos. In: N. Brodie, J. Doole, G. Gavalas and C. Renfrew (eds.) *Horizon: A colloquium on the prehistory of the Cyclades*. Cambridge: McDonald Institute for Archaeological Research, pp. 209–215.

Terrell, J.E. 1997. The postponed agenda: Archaeology and human biogeography in the twenty-first century. *Human Ecology* 25, 419–436.

Terrell, J.E., T.L. Hunt and C. Gosden. 1997. The dimensions of social life in the Pacific: Human diversity and the myth of the primitive isolate. *Current Anthropology* 38, 155–195.

Terrell, J.E., M. Miller and D. Roe. 1977. *Human biogeography*. Henley-on-Thames: Routledge & Kegan Paul.

Terrenato, N. 2002. The innocents and the sceptics: Antiquity and Classical archaeology. *Antiquity* 76, 1104–1111.

Theochari, M.D., L. Parlama and E. Hatzipouliou. 1993. Keramiki tis Proimis Chalkokratias III apo to Palamari tis Skyrou. In: C.W. Zerner (ed.) *Wace and Blegen: Pottery as evidence for trade in the Aegean Bronze Age 1939–1989*. Amsterdam: J.C. Gieben, pp. 187–193.

Thevenot, J. de. 1686. *The travels into the Levant* (A. Lowell, trans.). 3 vols. London: Faithorne, Adamson, Skegness and Newborough.

Thimme, J. (ed.). 1976. *Kunst und Kultur der Kykladeninseln*. Karlsruhe: Badisches Landesmuseum.

Thimme, J. 1989. Book review of 'Sculptors of the Cyclades. Individual and tradition in the third millennium by Pat Getz-Preziosi and Early Cycladic art in North American collections by Pat Getz-Preziosi, Jack L. Davis, Elisabeth Oustinoff'. *Gnomon* 61, 329–339.

Thomatos, M. 2006. *The final revival of the Aegean Bronze Age: A case study of the Argolid, Corinthia, Attica, Euboea, the Cyclades and the Dodecanese during LH IIIC Middle* (BAR International Series 1498). Oxford: Archaeopress.

Thucydides. 1919. *History of the Peloponnesian War. Books I and II*. C. Foster Smith (trans.). London/Cambridge, MA: Heinemann/Harvard University Press.

Tomas, H. 2010. Cretan Hieroglyphic and Linear A. In: E. Cline (ed.) *Oxford handbook of the Bronze Age Aegean*. Oxford: Oxford University Press, pp. 340–355.

Torrence, R. 1982. The obsidian quarries and their use. In: A.C. Renfrew and J.M. Wagstaff (eds.) *An island polity: The archaeology of exploitation in Melos*. Cambridge: Cambridge University Press, pp. 193–221.

Tourloukis, V. and P. Karkanas. 2012. The Middle Pleistocene archaeological record of Greece and the role of the Aegean in hominin dispersals: New data and interpretations. *Quaternary Science Reviews* 43, 1–15.

Tournefort, J.P. de. 1718. *A voyage into the Levant*. J. Ozell (trans.) 2 vols. London: Midwinter.

Trantalidou, C. 1990. Animals and human diet in the prehistoric Aegean. In: D.A. Hardy et al. (eds.) *Thera and the Aegean World III. Proceedings of the Third International Congress, Santorini, Greece, 6–9 September, 1989*. London: Thera Foundation, pp. 392–405.

Trantalidou, K. 2000. Animal bones and animal representations at Late Bronze Age Akrotiri. In: Sherratt, S. (ed.) *The wall paintings of Thera. Proceedings of the First International Symposium, 30 August–4 September 1997*. Athens: Thera Foundation, pp. 709–734.

Triantaphyllou, S. 2008. Living with the dead: a re-consideration of mortuary practices in the Greek Neolithic. In: V. Isaakidou and P. Tomkins (eds.) *Escaping the Labyrinth. The Cretan Neolithic in Context*. Oxford: Oxbow Books, pp. 136–154.

Tsigakou, F.-M. 1991. *Through romantic eyes: European images of 19th century Greece from the Benaki Museum, Athens*. Alexandria, VA: Arts Services International.

Tsipopoulou, M. 2007. Aghia Photia – Kouphota: A centre for metallurgy in the Early Minoan period. In: R.C.P. Doonan and P.M. Day (eds.) *Metallurgy in the Early Bronze Age Aegean*. Oxford: Oxbow Books, pp. 135–145.

Tsountas, C. 1898. Kykladika, *Archaiologiki Ephimeris*, 137–212.

Tsountas, C. 1899. Kykladika II, *Archaiologiki Ephimeris*, 73–134.

Tzachili, I. 1990. All important yet elusive: Looking for evidence of cloth-making at Akrotiri. In: D.A. Hardy et al. (eds.) *Thera and the Aegean World III. Proceedings of the Third International Congress, Santorini, Greece, 6–9 September, 1989*. London: Thera Foundation, pp. 380–389.

Tzachili, I. 2006. Ferdinand Fouqué à Santorin. In: P. Darcque, M. Fotiadis and O. Polychronopoulou (eds.) *Mythos: La préhistoire Égéenne du XIX[e] au XXI[e] siècle après J.-D*. (Bulletin de Correspondance Hellénique Suppl. 46). Athens: École Française d'Athènes, pp. 199–207.

Tzachili, I. 2007. Weaving at Akrotiri, Thera: defining cloth making activities as social process in a Late Bronze Age town. In: C. Gillis and M.-L. Nosch (eds.) *Ancient Textiles: production, craft and society*. Oxford: Oxbow Books, pp. 190–196.

Tzalas, H.E. 1989. O dromos tou opsidianiou me ena papyrenio skaphos stis Kyklades. *Archaeologia* 32, 11–20.

Tzalas, H.E. 1995. On the obsidian trail: With a papyrus craft in the Cyclades. In: H. Tzalas (ed.) *Tropis III. 3rd International Symposium on Ship Construction in Antiquity*. Athens: Hellenic Institute for the Preserveation of Nautical Tradition, pp. 441–469.

Van Andel, T.H. 1989. Late quaternary sea-level changes and archaeology. *Antiquity* 63, 733–745.

Van Andel, T.H. 2005. Coastal migrants in a changing world? An essay on the Mesolithic in the Eastern Mediterranean. *Journal of the Israel Prehistoric Society* 35, 381–397.

Van Andel, T.H., C.N. Runnels, and K.O. Pope. 1986. Five thousand years of land use and abuse in the Southern Argolid, Greece. *Hesperia* 55, 103–128.

Van Andel, T.H. and J.C. Shackleton. 1982. Late Palaeolithic and Mesolithic coastlines of Greece and the Aegean. *Journal of Field Archaeology* 9, 445–454.

Van Andel, T.H. and S.B. Sutton. 1987. *Landscape and people of the Franchthi region*. Bloomington: Indiana University Press.

Van Andel, T.H. and E. Zangger. 1990. Landscape stability and destabilisation in the prehistory of Greece. In: S. Bottema, G. Entjes-Jieborg and W. van Zeist (eds.) *Man's role in the shaping of the Eastern Mediterranean landscape*. Rotterdam: Balkema, pp. 139–157.

Van Andel, T.H., E. Zangger and A. Demitrack. 1990. Land use and soil erosion in prehistoric and historical Greece. *Journal of Field Archaeology* 17, 379–396.

Van Andel, T.H. et al. 1980. Late quaternary history of the coastal zone near Franchthi Cave, Southern Argolid, Greece. *Journal of Field Archaeology* 7, 389–402.

Van Gennep, A. 1960 (translation, original 1909) *The Rites of Passage*. Chicago: University of Chicago Press.

Vaughan, S.J., V. Kilikoglou and A. Papagiannopoulou. 1995. An interdisciplinary study of Middle Cycladic White Wares from Akrotiri on Thera. In: P.B. Vandiver, J.R. Druzik, J.L.G. Madrid, I.C. Freestone and G.S. Wheeler (eds.) *Materials issues in art and archaeology IV: Symposium held May 16–21, 1994, Cancun, Mexico*. Pittsburgh: Materials Research Society, pp. 434–445.

Vaughan, S.J. and D.E. Wilson. 1993. Interregional contacts in the Aegean in Early Bronze II: The talc ware connection. In: C.W. Zerner (ed.) *Wace and Blegen: Pottery as evidence for trade in the Aegean Bronze Age 1939–1989*. Amsterdam: J.C. Gieben, pp. 169–186.

Vaughan, S.J. 1990. Petrographic analysis of the Early Cycladic wares from Akrotiri, Thera. In: D.A. Hardy et al. (eds.) *Thera and the Aegean World III. Proceedings of the Third International Congress, Santorini, Greece, 6–9 September, 1989*. London: Thera Foundation, pp. 470–487.

Vin, J.P.A. van der 1980. *Travellers to Greece and Constantinople: Ancient monuments and old traditions in medieval travellers' tales. Vol. II*. Istanbul: Nederlands Historisch-Archaeologisch Instituut.

Vinther, B.M., H.B. Clausen, S.J. Johnsen, S.O. Rasmussen, K.K. Andersen, S.L. Buchardt, D. Dahl-Jensen, I.K. Seierstad, M.-L. Siggaard-Andersen, J.P. Steffensen, A.M.-L. Svensson, J. Olsen and J. Heinemeier. 2006. A synchronized dating of three Greenland ice cores throughout the Holocene. *Journal of Geophysical Research* 111, D13, 1–9.

Vinther, B.M., H.B. Clausen, S.J. Johnsen, S.O. Rasmussen, J.P. Steffensen, K.K. Andersen, S.L. Buchardt, D. Dahl-Jensen, I.K. Seierstad, A.M. Svensson, M.-L. Siggaard-Andersen, J. Olsen and J. Heinemeier. 2008. Reply to comment by J.S. Denton and N.J.G. Pearce on 'A Synchronized dating of three Greenland ice cores throughout the Holocene'. *Journal of Geophysical Research* 113, D12, 1–4.

Vitale, S. and T. Hancock-Vitale. 2010. The Minoan and Mycenaean expansion in the Dodecanese. The evidence from the 'Serraglio' on Kos and its theoretical implications. In: K. Dziegielewski, M.S. Przybyla and A. Gawlik (eds.) *Migration in Bronze and early Iron Age Europe*. Krakow: Ksiegarnia Akademicka, pp. 63–85.

Vitale, S. and T. Hancock Vitale. 2013. The Minoans in the southeastern Aegean? The evidence from the 'Serraglio' on Kos and its significance. In: E.M. Alberti and S. Sabatini (eds.) *Exchange networks and local transformations*. Oxford: Oxbow Books, pp. 44–59.

Vitelli, K.D. 1989. Were pots first made for foods? Doubts from Franchthi. *World Archaeology* 21, 17–28.

Vlachopoulos, A.G. 1999. Cultural, social and political organization in the Cyclades during the Late Helladic IIIC Period. In: I. Kilian-Dirlmeier and M. Egg (eds.) *Eliten in der Bronzezeit: Ergebnisse zweier Kolloquien in Mainz und Athen*. Mainz: Römisch-Germanisches Zentralmuseum, pp. 79–86.

Vlachopoulos, A.G. 2003. The Late Helladic IIIC 'Grotta Phase' of Naxos. Its synchronism in the Aegean and its non-synchronisms in the Cyclades. In: S. Deger-Jalkotzy and M. Zavadil (eds.) *LH IIIC chronology and synchronisms*. Wien: Verlag der Österreichischen Akademie der Wissenschaften, pp. 217–234.

Vlachopoulos, A.G. 2008a. A Late Mycenaean journey from Thera to Naxos: The Cyclades in the twelfth century B.C. In: N. Brodie, J. Doole, G. Gavalas and C. Renfrew (eds.) *Horizon: A colloquium on the prehistory of the Cyclades*. Cambridge: McDonald Institute for Archaeological Research, pp. 519–531.

Vlachopoulos, A.G. 2008b. The wall paintings from the Xeste 3 building at Akrotiri: Towards an interpretation of the iconographic programme. In: N. Brodie, J. Doole, G. Gavalas and C. Renfrew (eds.) *Horizon: A colloquium on the prehistory of the Cyclades*. Cambridge: McDonald Institute for Archaeological Research, pp. 451–465.

Vlami, A. 2010. Tourism policy and development issues: The financing and regionalization policy of Greek tourism. *Romanian Journal of Regional Science* 4, 91–106.

Vryonis, S. (ed.). 1993. *The Greeks and the sea*. New York: Aristide D. Caratzas Publisher.

Wachsmann, S. 1998. *Seagoing ships and seamanship in the Bronze Age Levant*. London: Chatham.

Wachsmann, S. 2000. Some notes on Mediterranean seafaring during the second millennium BC. In: S. Sherratt (ed.) *The wall paintings of Thera. Proceedings of the First International Symposium, 30 August–4 September 1997*. Athens: Thera Foundation, pp. 803–824.

Wagner, G.A. and G. Weisgerber. 1980. The ancient silver mine at Ayos Sostis on Siphnos (Greece). *Proceedings of the 18th International Symposium on Archaeometry and Archaeological Prospection, Bonn, 14–17 March 1978*. Rheinland-Verlag GmbH, pp. 209–222.

Wagstaff, M. and J.F. Cherry. 1982. Settlement and population change. In: A.C. Renfrew and J.M. Wagstaff (eds.) *An island polity: The archaeology of exploitation in Melos*. Cambridge: Cambridge University Press, pp. 136–155.

Wagstaff, M. and C. Gamble. 1982. Island resources and their limitations. In: A.C. Renfew and J.M. Wagstaff (eds.) *An island polity: The archaeology of exploitation in Melos*. Cambridge: Cambridge University Press, pp. 95–105.

Wallace, A.R. 1869. *The Malay Archipelago*. London: Palgrave Macmillan.

Wallace, A.R. 1892. *Island life: Or the phenomena and causes of insular faunas and floras including a revision and attempted solution of the problem of geological climates*. London: Palgarve Macmillan.

Warren, P.M. 1979. The stone vessels from the Bronze Age settlement at Akrotiri, Thera. *Archaeologike Ephemeris*, 82–113.

Warren, P.M. 1988. *Minoan religion as ritual action*. Göteborg: Paul Åströms Förlag.

Warren, P.M. 2009. The date of the Late Bronze Age eruption of Santorini. In: D.A. Warburton (ed.) *Time's up: Dating the Minoan eruption of Santorini. Athens: The Danish Institute at Athens*, pp. 181–186.

Warren, P.M. and V. Hankey. 1987. *Aegean Bronze Age chronology*. Bristol: Bristol Classical Press.

Warren, P.M. and H. Puchelt, H. 1990. Stratified pumice from Bronze Age Knossos. In: C.G. Doumas (ed.) *Thera and the Aegean World. Papers presented at the Second International Scientific Congress, Santorini, Greece, August 1978*. London: Thera Foundation, pp. 71–81.

Watrous, L.V., D. Xatzi-Vallianou, K. Pope, N. Mourtzas, J. Shay, C.T. Shay, J. Bennet, D. Tsoungarakis, C. Vallianos and H. Blitzer. 1993. A survey of the Western Mesara plain in Crete: preliminary report of the 1984, 1986, and 1987 field seasons. *Hesperia* 62, 191–248.

Weiss, H. 2012. *Seven generations since the fall of Akkad*. Wiesbaden: Harrassowitz Verlag.

Weiss, H., M-A. Courty, W. Wetterstrom, F. Guichard, L. Senior, R. Meadow and A. Curnow. 1993. The genesis and collapse of third millennium North Mesopotamian civilization, *Science*. New Series 261, 995–1004.

Weiss, R. 1969. *The renaissance discovery of classical antiquity*. Oxford: Oxford University Press.

Wheler, G. 1682. *A journey into Greece*. London: Cademan, Kettlewell and Churchill.

Whitelaw, T. 1991. Ethnoarchaeology of recent rural settlement and land use in northwest Keos. In: J.F. Cherry, J.L. Davis and E. Mantzourani (eds.) *Landscape archaeology as long-term history. Northern Keos in the Cycladic islands from the earliest settlement until modern times*. Los Angeles: Institute of Archaeology, UCLA, pp. 403–454.

Whitelaw, T. 2004. The development of an island centre: urbanization at Phylakopi on Melos. In: J. Cherry, C. Scarre and S. Shennan (eds.) *Explaining social change. Studies in honour of Colin Renfrew*. Cambridge: McDonald Institute for Archaeological Research, pp. 149–166.

Whitelaw, T. 2005. A tale of three cities: Chronology and Minoanisation at Phylakopi in Melos. In: A. Dakouri-Hild and S. Sherratt (eds.) *Autochthon. Papers presented to O.T.P.K. Dickinson on the occasion of his retirement* (BAR International Series S1432). Oxford: Archaeopress, pp. 37–69.

Whitelaw, T. 2007. The objectives and methods of the 1987 surface survey at Dhaskalio Kavos. In: C. Renfrew, C. Doumas, L. Marangou and G. Gavalas (eds.) *Keros, Dhaskalio Kavos: The investigations of 1987–88*. Cambridge. McDonald Institute for Archaeological Research, pp. 39–78.

Whitelaw, T., P.M. Day, E. Kiriatzi, et al. 1997. Ceramic traditions at EM IIB Myrtos, Fournou Korifi. In: R. Laffineur and P.P. Betancourt (eds.) *TEXNH. Craftsmen, craftswomen and craftsmenship in the Aegean Bronze Age. Proceedings of the 6th International Aegean Conference Philadelphia, Temple University, 18–21 April 1996* (Aegaeum 16). Liège/Austin: Université de Liège/University of Texas at Austin, pp. 265–274.

Whitley, J. 1991. *Style and society in Dark Age Greece*. Cambridge. Cambridge University Press.

Whittaker, H. 1997. *Mycenaean cult buildings: A study of their architecture and function in the context of the Aegean and the Eastern Mediterranean*. Bergen: The Norwegian Institute at Athens.

Wiener, M.H. 1984. Crete and the Cyclades in LM I: The tale of the conical cups. In: R. Hägg and N. Marinatos (eds.) *The Minoan Thalassocracy: Myth and reality*. *Proceedings of the Third International Symposium at the Swedish Institute in Athens, 31 May–5 June, 1982*. Stockholm: Svenska Institutet i Athen, pp. 17–26.

Wiener, M.H. 2009a. The state of the debate about the date of the Theran eruption, In: D.A. Warburton (ed.) *Time's Up: Dating the Minoan eruption of Santorini*. Athens: The Danish Institute at Athens, pp. 197–206.

Wiener, M.H. 2009b. Cold fusion: The uneasy alliance of history and science. In: M.J. Bruce (ed.) *Tree-rings, kings, and old world archaeology and environment. Papers presented in honor of Peter Ian Kuniholm*. Oxford: Oxbow Books, pp. 277–292.

Wiener, M.H. 2012. Problems in the measurement, calibration, analysis and communication of radiocarbon dates (with special reference to the prehistory of the Aegean world). *Radiocarbon* 54, 423–434.

Wild, E.M., W. Gauß, G. Fortenpointner, M. Lindblom, R. Smetana, P. Steier, U. Thanheiser and F. Weninger. 2010. ^{14}C dating of the Early to Late Bronze Age stratigraphic sequence of Aegina Kolonna, Greece. *Nuclear Instruments and Methods in Physics Research B* 268(7–8), 1013–1021.

Williamson, M. 1981. *Island populations*. Oxford: Oxford University Press.

Willis, K.J. 1994. The vegetational history of the Balkans. *Quaternary Science Reviews* 15, 769–788.

Wills, D. 2007. *The mirror of antiquity: 20th century British travellers in Greece*. Cambridge: Cambridge University Press.

Wilson, D.E. 1999. *Keos IX. Ayia Irini Period I-III: The Neolithic and Early Bronze Age settlements: Part 1. The pottery and small finds*. Mainz: von Zabern.

Wilson, D.E., P.M. Day and N. Dimopoulou-Rethemiotaki. 2008. The gateway port of Poros-Katsambas: Trade and exchange between north-central Crete and the Cyclades in EB I-II. In: N. Brodie, J. Doole, G. Gavalas and C. Renfrew (eds.) *Horizon: A colloquium on the prehistory of the Cyclades*. Cambridge: McDonald Institute for Archaeological Research, pp. 261–270.

Winckelmann, J.J. 1764. *Geschichte der Kunst des Alterthums*. 4 vols. Wien: Akademischer Verlag.

Winder, N. 1993. When is a time-trend not a time-trend? Scale and profile at Bronze Age Phylakopi (Melos). *Circaea* 11, 49–64.

Wrede, W. 1935/1936. Vorgeschichtliches in der Stadt Samos. Fundtatsachen. *Mitteilungen des Deutschen Archäologischen Institutes* 50–51, 112–124.

Yalouris, E. 1986. Notes on the topography of Chios. In: J. Boardman and C.E. Vaphopoulou-Richardson (eds.) *Chios: A conference at the Homereion in Chios*. Oxford: Oxford University Press, pp. 141–168.

Yokoyama, I. 1978. The tsunami caused by the prehistoric eruption of Thera. In: C.G. Doumas (ed.) *Thera and the Aegean World. Papers presented at the Second International Scientific Congress, Santorini, Greece, August 1978*. London: Thera Foundation, pp. 277–283.

Younger, J. 2015. Linear A texts in phonetic transcription & commentary. http://people.ku.edu/~jyounger/LinearA/ [accessed 11/6/15]

Zachos, K. 1999. Zas Cave on Naxos and the role of caves in the Aegean Late Neolithic. In: P. Halstead (ed.) *Neolithic society in Greece*. Sheffield: Sheffield Academic Press, pp. 153–163.

Zachos, K. 2007. The Neolithic background: A reassessment. In: P.M. Day and R.C.P. Doonan (eds.) *Metallurgy in the Early Bronze Age Aegean*. Oxford: Oxbow Books, pp. 168–206.

Zachos, K. and A. Dousougli. 2008. Observations on the Early Bronze Age sealings from the Cave of Zas at Naxos. In: N. Brodie, J. Doole, G. Gavalas and C. Renfrew (eds.) *Horizon: A colloquium on the prehistory of the Cyclades*. Cambridge: McDonald Institute for Archaeological Research, pp. 85–95.

Zangger, E. 1992. Neolithic to present soil erosion in Greece. In: M. Bell and J. Boardman (eds.) *Past and present soil erosion*. Oxford: Oxbow Books, pp. 133–147.

Zapheiropoulou, P. 1968. Kyklades: Keros. *Archaiologikon Deltion* 23(B), 381–383.

Zapheiropoulou, P. 2008. Early Bronze Age cemeteries of the Kampos Group on Ano Kouphonisi. In: N. Brodie, J. Doole, G. Gavalas and C. Renfrew (eds.) *Horizon: A colloquium on the prehistory of the Cyclades*. Cambridge: McDonald Institute for Archaeological Research, pp. 183–194.

Zielinski, G.A. and M.S. Germani. 1998. New ice-core evidence challenges the 1620s BC age for the Santorini (Minoan) Eruption. *Journal of Archaeological Science* 25, 279–289.

Zohary, D. and M. Hopf. 2000. *Domestication of plants in the old world*. Oxford: Oxford University Press.

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